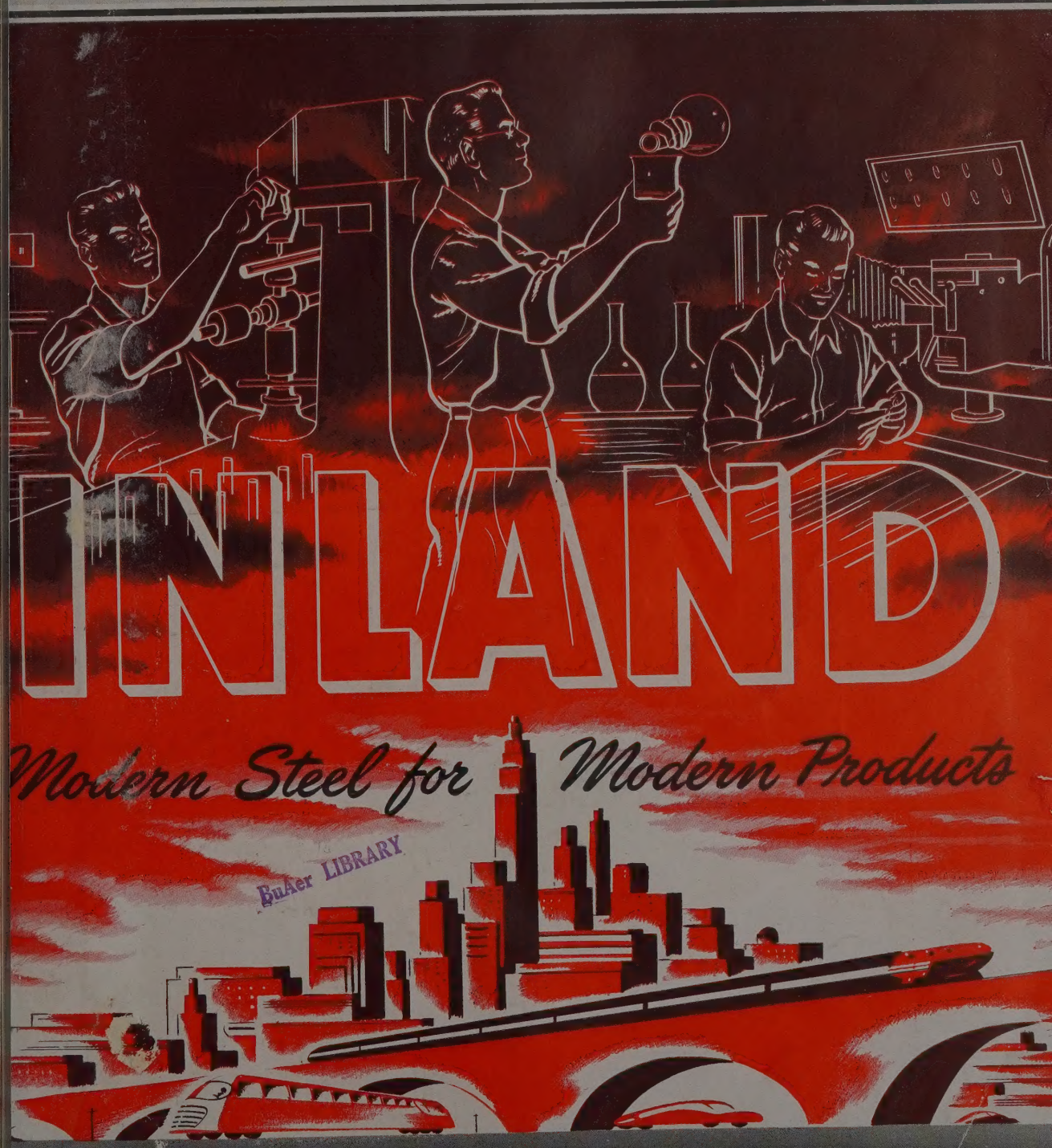
April 7, 1947

STEEL

The Magazine of Metalworking and Metalproducing

ESTABLISHED 1882

EDITORIAL INDEX, PAGE 55



INLAND STEEL CO.
CHICAGO

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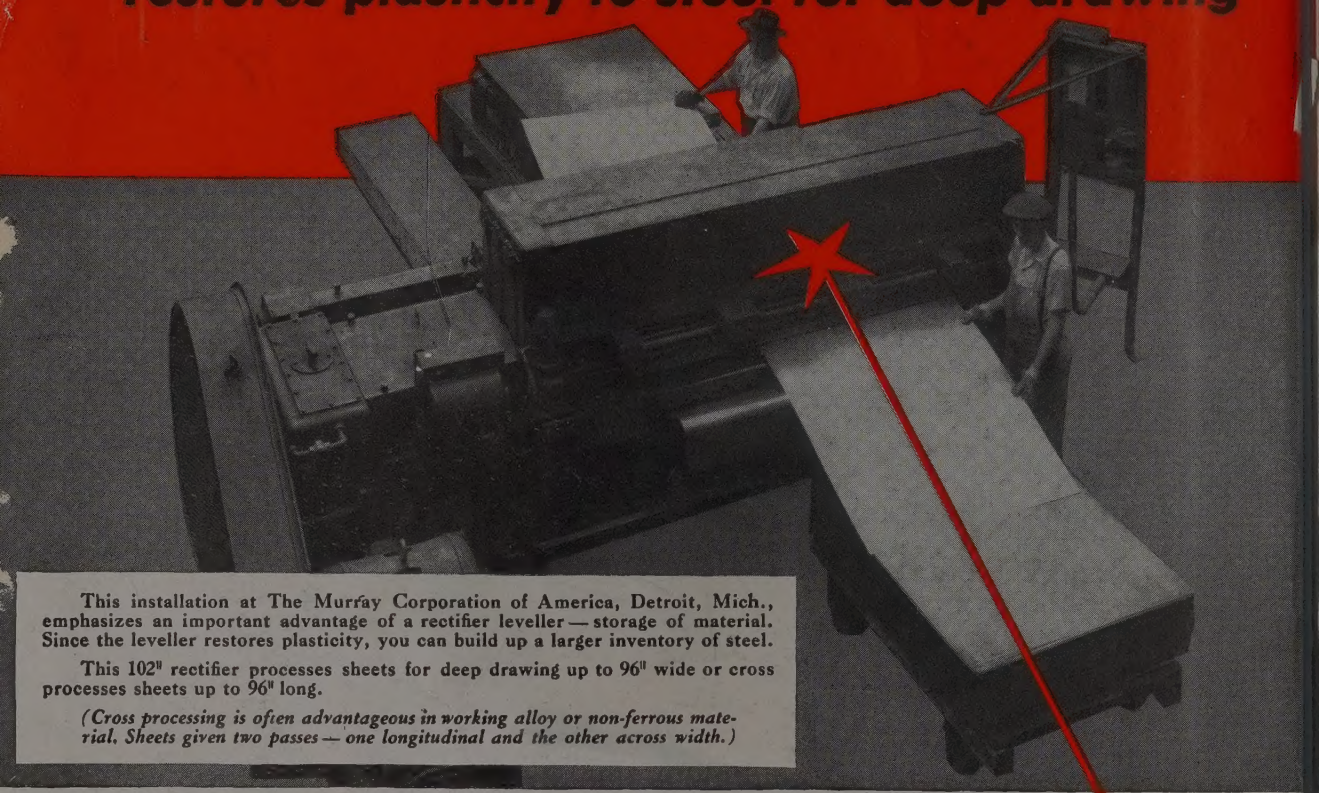
RECTIFIER LEVELLER

restores plasticity to steel for deep drawing



This installation at The Murray Corporation of America, Detroit, Mich., emphasizes an important advantage of a rectifier leveller — storage of material. Since the leveller restores plasticity, you can build up a larger inventory of steel.

This 102" rectifier processes sheets for deep drawing up to 96" wide or cross processes sheets up to 96" long.

(Cross processing is often advantageous in working alloy or non-ferrous material. Sheets given two passes — one longitudinal and the other across width.)

Properly rectified, blanks, sheets or strip take a deep draw easily. 15 individual flexing operations, each equivalent to bending around an individual roll of slightly larger diameter, restore much of the original plasticity, thereby eliminating most hand finishing after drawing.

Blanks of any shape, sheets or strip can be uniformly processed without distortion. There is no unprocessed portion of the leading end of the material.

Entering brush rolls and automatic spray cleans and oil-coats the material as the steel moves through the rectifier leveler.

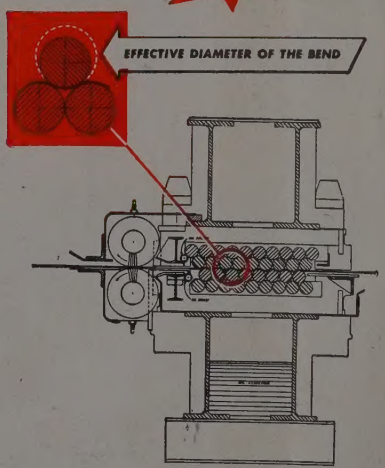
Aetna-Standard, largest manufacturers of levellers, developed the rectifier leveller 13 years ago for the automobile industry. Since then, many improvements have been made in the original design. Put a rectifier leveller to work for you and eliminate many deep drawing headaches. Ask Aetna-Standard for recommendations.

DESIGNERS AND BUILDERS to the Steel, Non-Ferrous and Chemical Industries

THE AETNA-STANDARD ENGINEERING CO. YOUNGSTOWN, OHIO

ASSOCIATED COMPANY

HEAD, WRIGHTSON & COMPANY, LIMITED MIDDLEBOROUGH, ENGLAND



As every increment of the material flows through the effective bend area, no further increase in the wrap around roll can increase the internal work in the material. The smaller diameter roll used, the greater the processing obtained. We use smaller diameter rolls practical for the gauges to be processed. 57 backing up rolls and 114 bearings permit use of these extremely small diameter work rolls.

Aetna-Standard

Mayari R STIFFENING-GIRDERS SAVE 32,000 LBS IN ORLEANS BRIDGE

Stiffening-girders of Mayari R high-strength, low-alloy steel were used in the Orleans suspension bridge, Humboldt County, California.

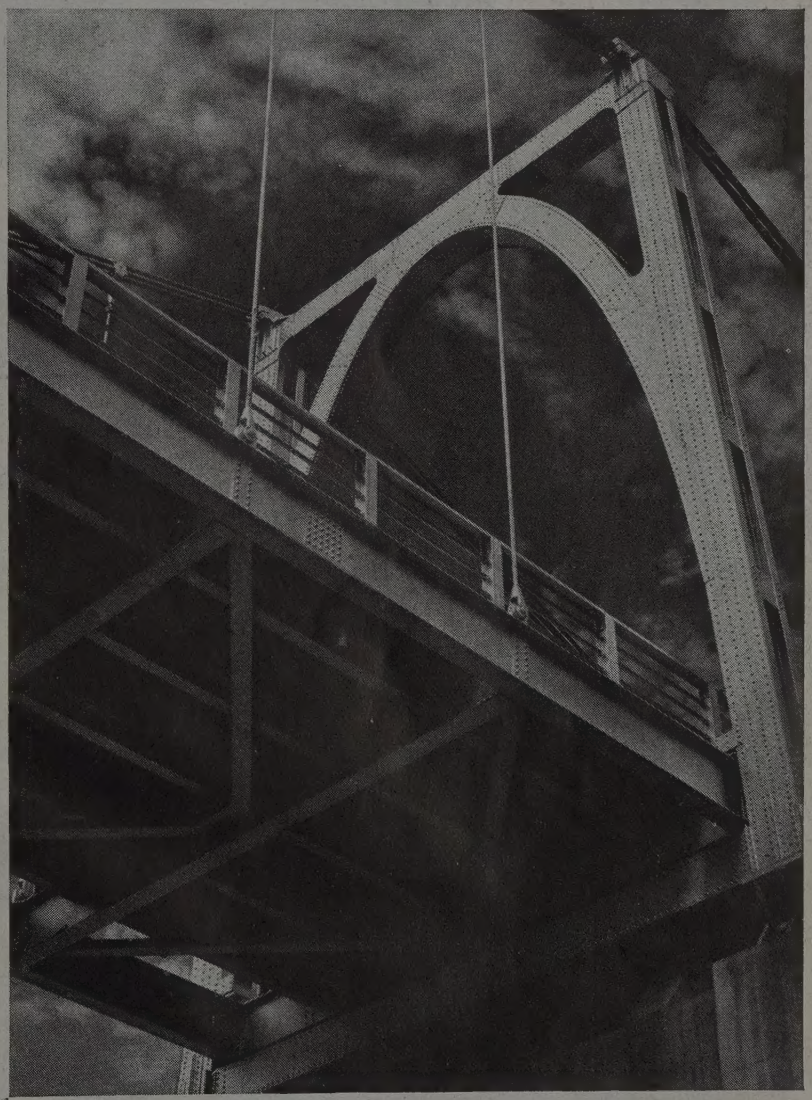
The two girders for the 360-ft span were made of 30-in, 108-lb Mayari R sections. The girders were fabricated as chords of the dead-load camber curve and were fully spliced at 36-ft lengths. Their total weight is approximately 87,000 lbs.

Girders of equivalent strength fabricated from ordinary structural steel would have weighed 119,000 lbs or approximately 27 pct more than the girders of Mayari R.

Weight saving here as in most bridge structures is obviously a matter of engineering and economic importance. Mayari R has the mechanical properties that allow efficient, weight-saving design. With 70,000 psi tensile strength and 50,000 psi yield point Mayari R can be used in lighter sections without compromising strength. Or where greater strength is needed in the finished structure Mayari R shapes can be used to provide it, but without increasing deadweight.

Mayari R also has greater resistance to atmospheric corrosion than carbon steel—a highly-important consideration where lighter sections are specified.

For suggested stresses in bridge design and other Mayari R information write or phone for Catalog 209.



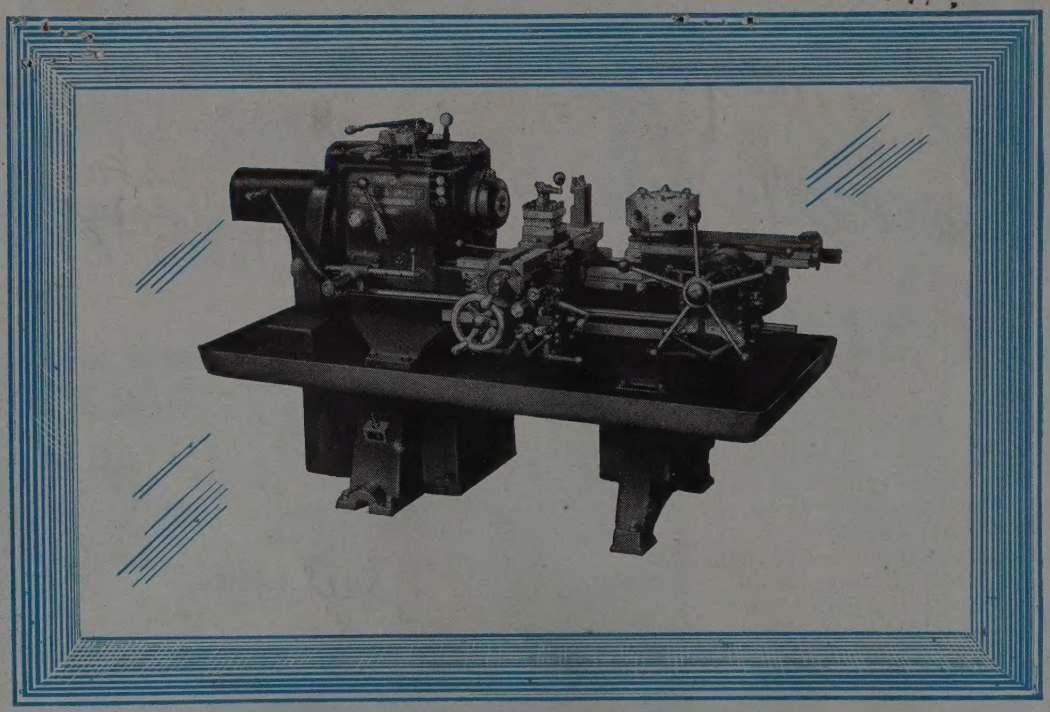
Fish-eye view of Orleans Bridge showing stiffening-girders of Mayari R. Left, Orleans Bridge on Highway 96 spanning the Klamath River. This bridge was designed by the State of California and fabricated by the Judson-Pacific Company. Contractors were C. W. Calletti Company.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

BETHLEHEM STEEL

Mayari R *makes it lighter... stronger... longer lasting*



Portrait of an expert in employee relations

BETTER PAY FOR WORKERS, shorter hours, easier work—and more and better things at lower prices for the public—are all possible by the efficient use of modern machine tools. *And they are NOT possible in any other way.*

Modern machine tools are easier for workmen to use, and produce better products. Because of new improvements and greater power, these tools, *efficiently used,* produce more. Out of this greater production a workman, even in shorter hours, can be paid more and *still* produce at a lower cost per piece.

These lower costs can mean lower prices for the public. Lower prices can mean more sales and a more profitable operation, and that makes the workman's job more secure.

But note that *two* things are necessary:

1. The modern tools. That's up to management.

2. Their efficient use. That's up to workmen.

The tools are ready. If people went to work and used them properly, instead of all this talk about easy-roads-to-riches-without-work, we would have no inflation, no shortages; we *would* have good jobs at good pay; we would have prosperity and peace.

WARNER & SWASEY
Machine Tools
Cleveland

You can machine it better, faster, for less... with a Warner & Swasey

TURRET LATHES, MULTIPLE SPINDLE AUTOMATICS, PRECISION TAPPING & THREADING MACHINES

a thousand and one

MACWHYTE WIRE ROPES

...all job-proved...assure you the correct rope for your equipment

When you use the correct wire rope, both the rope and your equipment last longer, cost less to operate. Macwhyte consulting engineers will check your equipment and recommend the wire rope specifically engineered for your job. Ask your Macwhyte distributor, or write Macwhyte Company.

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Manufactured by Macwhyte Company
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MACWHYTE PREFORMED AND NON-PREFORMED INTERNALLY LUBRICATED WIRE ROPES . . . MONARCH WHYTE STRAND Wire Rope . . . Special Traction Elevator Rope . . Stainless Steel Wire Rope . . . Monel Metal Wire Rope . . . Galvanized Wire Rope. . . . Atlas Braided Wire Rope Slings, Hi-Fatigue Aircraft Cables, Assemblies and Tie-Rods. Catalogs on request.

Behind the Scenes . . .

Guy in Texas

At this writing, Machine Tool Editor Guy Hubbard has just returned from a little junket to Texas where he wowed the folks at the American Society of Tool Engineers' convention. Guy seemed to be much in demand by the good folk of Texas and he was quite a busy fellow for several days. He went down there to cover the meeting for STEEL and wound up not only doing that, but also appearing on a round table discussion on the radio, filling in for a speaker on the association program when that speaker became snowbound somewhere in the north country, and winding it up with an interview for the Houston Post complete with his picture in the paper and a long story about the importance of Texas' future in the metal-working industry. As the old vaudevillians used to say "Ah, Texas—they loved him there."

Stuff Coming Up

We have been wandering around up on the ninth floor peeking over the shoulders of the editors again to see what's coming up in early issues. The joint is loaded with good stuff which will be dished out as fast as our bulging pages can take care of it. We might note here and now a couple of articles coming right up in which you will be much interested. One of them is a brand new story on the brand new subject of vacuum melting and the other one is an interesting new development in hydraulic forming of steel sheets. At this point both these articles are scheduled for next week's book and we fervently hope that when you pick up the issue next Monday, you'll find them there and not make it necessary for us to apologize a little later on because you looked and looked and couldn't find a thing.

Circulation Story

Some of the address changes in our file tell small stories by themselves. Take for instance, the subscriber who first entered his subscription from Washington, D. C., moved it to New York, later to a small town in Illinois, and now has written to us asking we ship it overseas to an address in the Far East. The story around these moves is something like this: The Washington address indicated a position during the war with the British Supply Mission and when that folded up the New York address was from a hotel where our subscriber was living while making new connections. The Illinois address told us that he had made his new connection and was spending some time at the company's plant learning the ins and outs of the business and the final change shows he was made sales manager of the Illinois company for the Far East and is now enroute to his new territory. This particular subscriber has been quite insistent that we get every copy to him and he says "I know of no other magazine which will serve me so well; it has what I want and is not filled up with stuff I don't want." We like to think of this friend of ours as a worker in the metalworking industries carrying the tools of his trade along with him, one of the most important of which is you know what.

Copies Are All

Most of the time our energetic and affable Readers' Service Department can comply with your requests with alacrity and wholehearted cooperation. All those big words merely mean that when you write in and ask for something, R. S. D. jumps up and runs around frantically trying to take care of everything you ask for. Once in a while, however, they have to strike out as they are now striking out on additional requests for the series on vibration insulation. We just don't have any more copies of that series available so if any of you have written in over the past week or so for copies or intend to write in, you will probably receive a very apologetic "no" from the people in charge of digging up extra copies. Of course, if somebody wants to come through with an order for several hundred copies of that series, we can probably persuade our print shop to run them off at a nominal fee.

Puzzle Status

We have been running our puzzle corner only every other week lately because we were afraid it had grown to such proportions that it was taking up an undue amount of space. We had a few problems built up as a backlog which we have been using. We'll soon come to the end of the string and use up the original problems which some of you have been kind enough to send in. And by the way, if any more of you have original problems you'd like to have us run in our puzzle corner, shoot them along. We'll be very happy to have them.

Shrdlu

(Editorial Index—page 55)

STEEL
Vol. 120—No. 14 April 7, 1947

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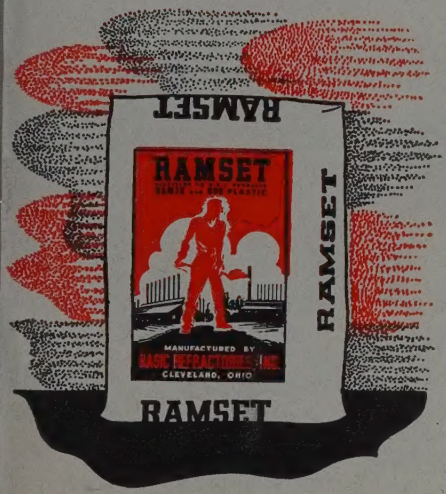
Editorial Staff on Contents Page

ONE SWALLOW *doesn't make a summer*



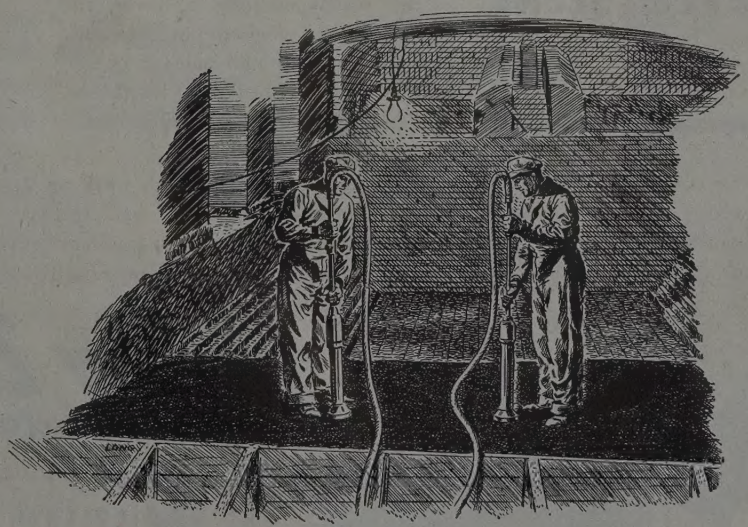
RAMSET

Successor to B.R.I. products Ramix and 695 Plastic

NOR does one campaign on a new bottom prove its serviceability.

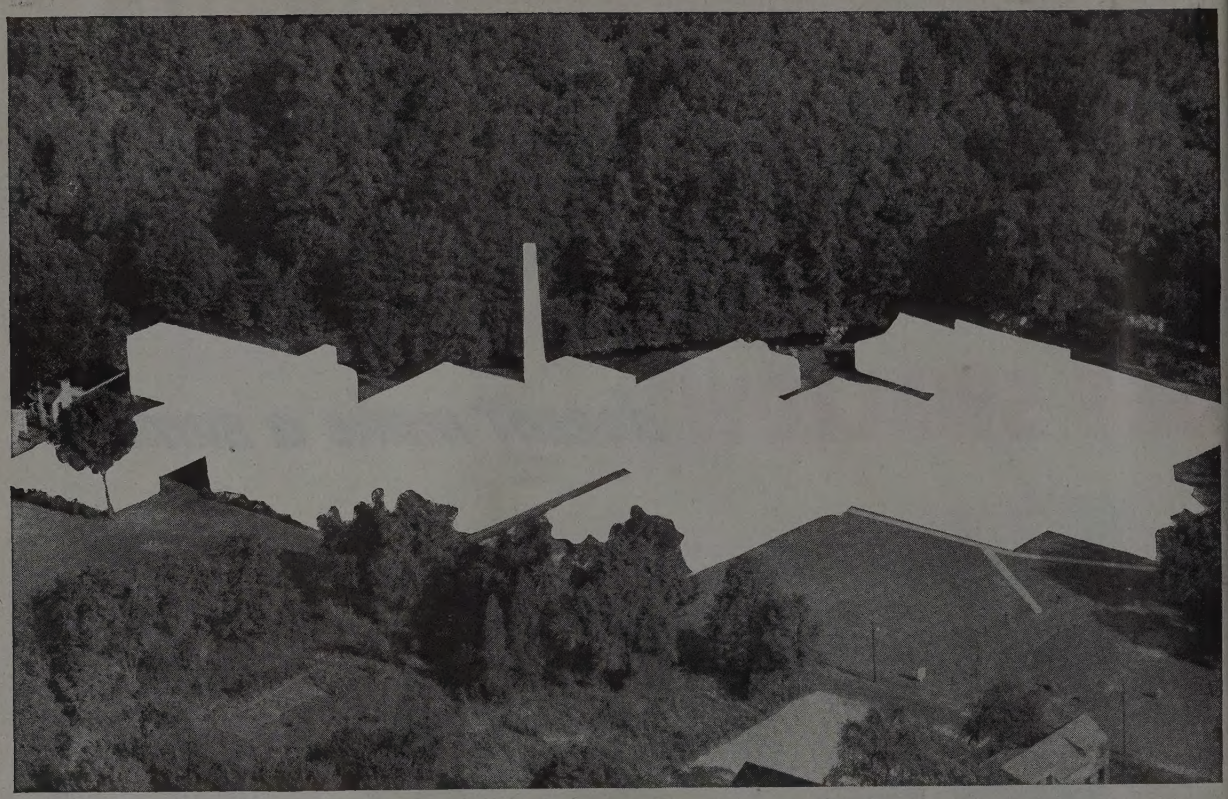
It is the "flock" of records that keep coming, year in and year out, which prove the value of rammed hearths, constructed of Ramix, the original cold ramming magnesia refractory. Here, for example, is another recent service report: "Lost time on 9 Ramix bottoms in this shop is unusually low. Open hearth superintendent reports an average of 8 minutes per heat, over 45 minute bogey, including tap hole delays. His boys take care of the bottoms and do an excellent maintenance job."

A report has just arrived of the excellent service rendered by the first full hearth constructed of RAMSET, successor to B.R.I.'s Ramix—"Delay time 9½ minutes beyond bogey of 40 minutes, in 198 heats". This and other early reports are substantiating what laboratory and service tests so clearly indicated—that RAMSET, made from the same stable, hydration-resistant magnesia clinker as Ramix, is superior to the latter in workability, strength and refractoriness.



Basic Refractories Incorporated 845 HANNA BUILDING, CLEVELAND 15, OHIO

Exclusive Agents in Canada: REFRACTORIES ENGINEERING AND SUPPLIES, LTD., Hamilton and Montreal

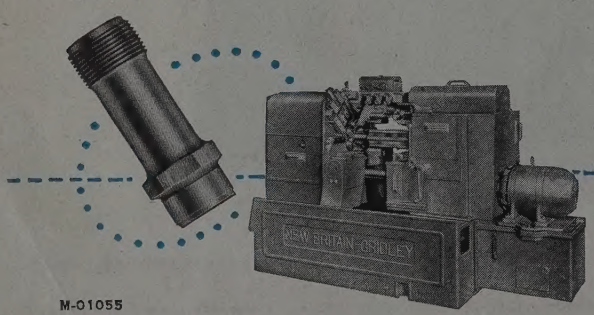


THE PLANT NOBODY HAS EVER SEEN

INDUSTRIAL engineers, labor leaders, management men agree that there never yet has been a manufacturing plant in America that has achieved its absolute maximum of production. Suppose one did exist in which management provided every possible facility, employees used them to the utmost, and management in turn regularly devoted a substantial share of the plant's earnings to invest in more and more efficient machines and methods. Certainly high wages and good returns on stock owners' investments would be no problem to such a business.

Perhaps the absolute ideal plant will never exist, but the tools exist *right now* to enable almost any manufacturer and his employees to achieve spectacular improvements for their mutual welfare. Such an opportunity lies in management's providing the finest, modern production machinery and the latest production methods. In employees' using such machines for all they are worth. Read below how one manufacturer is taking advantage of this opportunity.

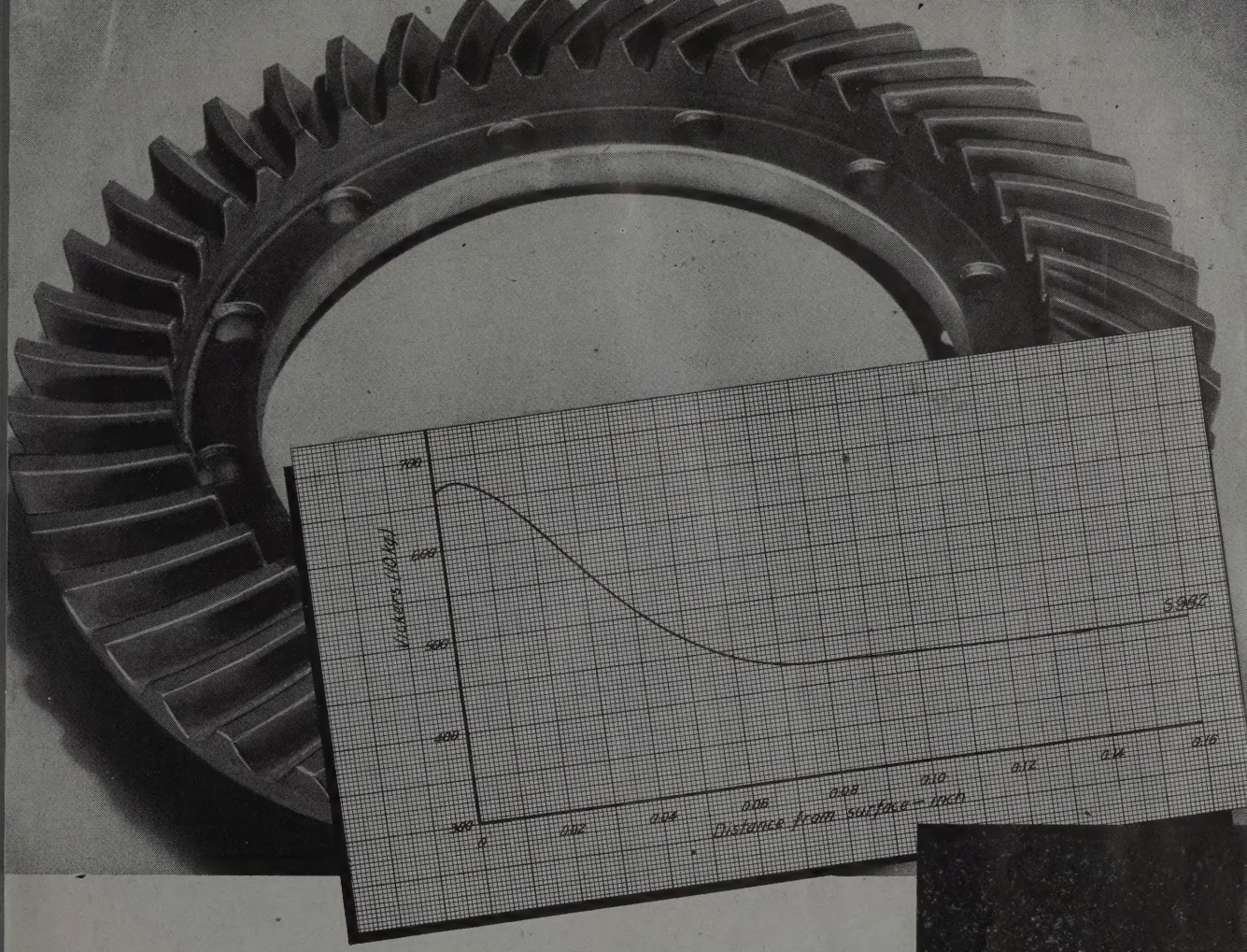
EXAMPLE: The aircraft part shown below, is typical of swift, economical, accurate automatic screw machine performance. Speed is maintained by breaking down the inside boring and reaming into four operations. A total of eleven tools work on this piece which is threaded and cut off in the last position, and close limits of concentricity must be maintained between threads and bore. Regular day by day production: 312 pieces per hour.



M-01055

New Britain Automatics

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT



BETTER GEARS, CAMS, SPLINES...FROM

AISI A 6120 CHROMIUM-VANADIUM STEEL

Of particular significance is the curve shown in the accompanying graph, for it represents the gradual decrease in hardness penetration that is one of the notable characteristics of A 6120 Chromium-Vanadium carburized steel.

An example of the excellent light case—free of embrittling carbides—imparted to this steel by a simple direct quench and temper treatment is clearly presented in the photomicrograph.

Unusually strong, hard and wear-resistant, this case and the inherently tough and ductile core are bonded to an exceptional degree by the uniform decrease in carbon penetration from case to core. In service, these superior properties assure longer life and more dependable performance.

Our metallurgists will be glad to work with you in the application of Chromium-Vanadium carburizing steels.

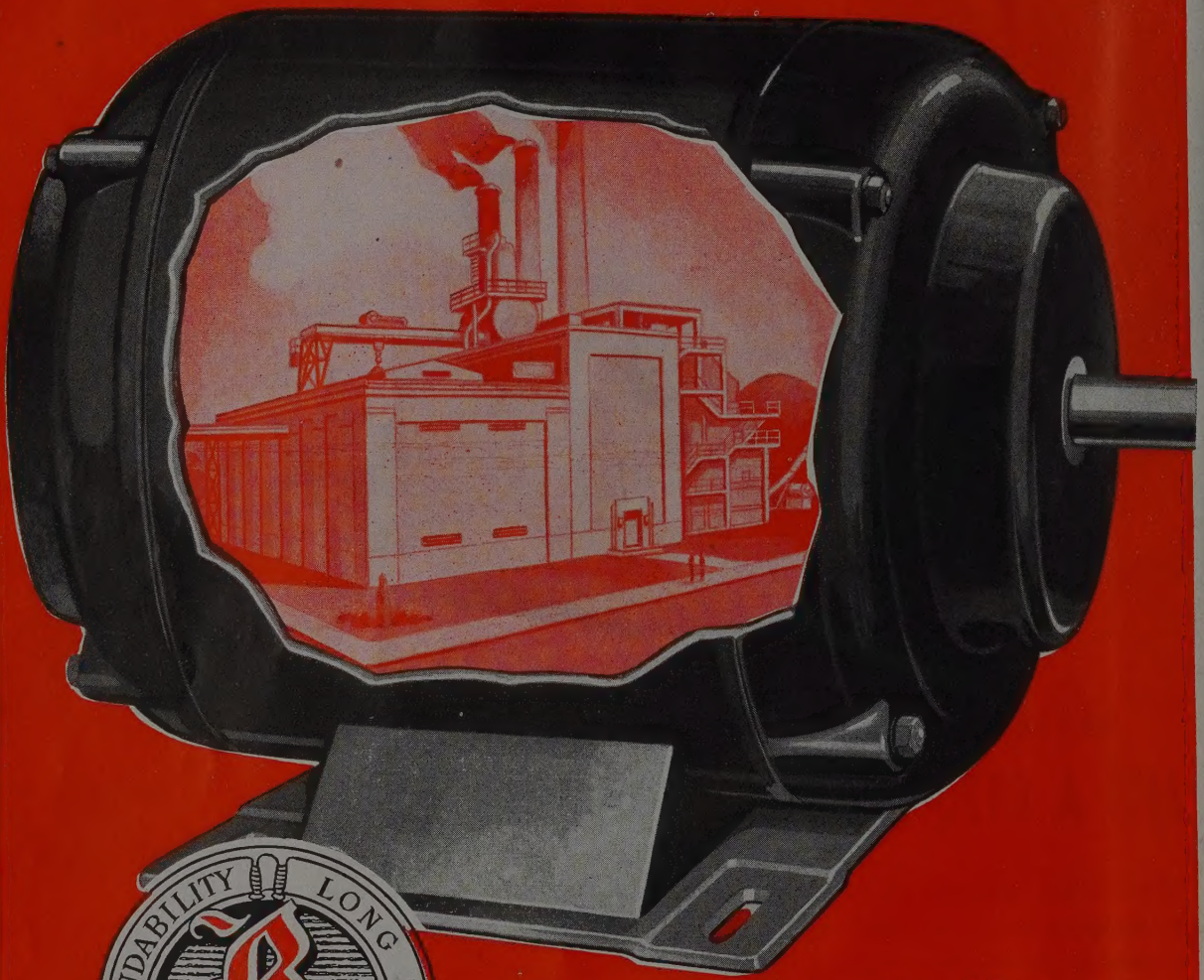
Photomicrograph (100x) and hardness penetration graph of Chromium-Vanadium A 6120 steel, with a light case (0.80–0.85% carbon) in outer .010 inch.

VANADIUM CORPORATION OF AMERICA

420 LEXINGTON AVENUE, NEW YORK 17, N.Y. • DETROIT • CHICAGO • CLEVELAND • PITTSBURGH

B-Line

AN ELECTRIC "POWER HOUSE" WITH POWER TO SPARE



DEPENDABILITY LONG LIFE B LINE ECONOMY

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LEADING INDEPENDENT MOTOR MANUFACTURER

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PLANTS AT DAYTON, WILMINGTON AND XENIA, OHIO—OFFICES IN PRINCIPAL CITIES

FORD

Ingalls fabricated steel used in the new Ford assembly plant at Hapeville, Ga.

GENERAL MOTORS

. . . and in this addition to General Motors' Harrison Radiator Division, Lockport, N. Y.

CHRYSLER

. . . and in the new Dayton, Ohio plant for Chrysler Corporation's Airtemp Division

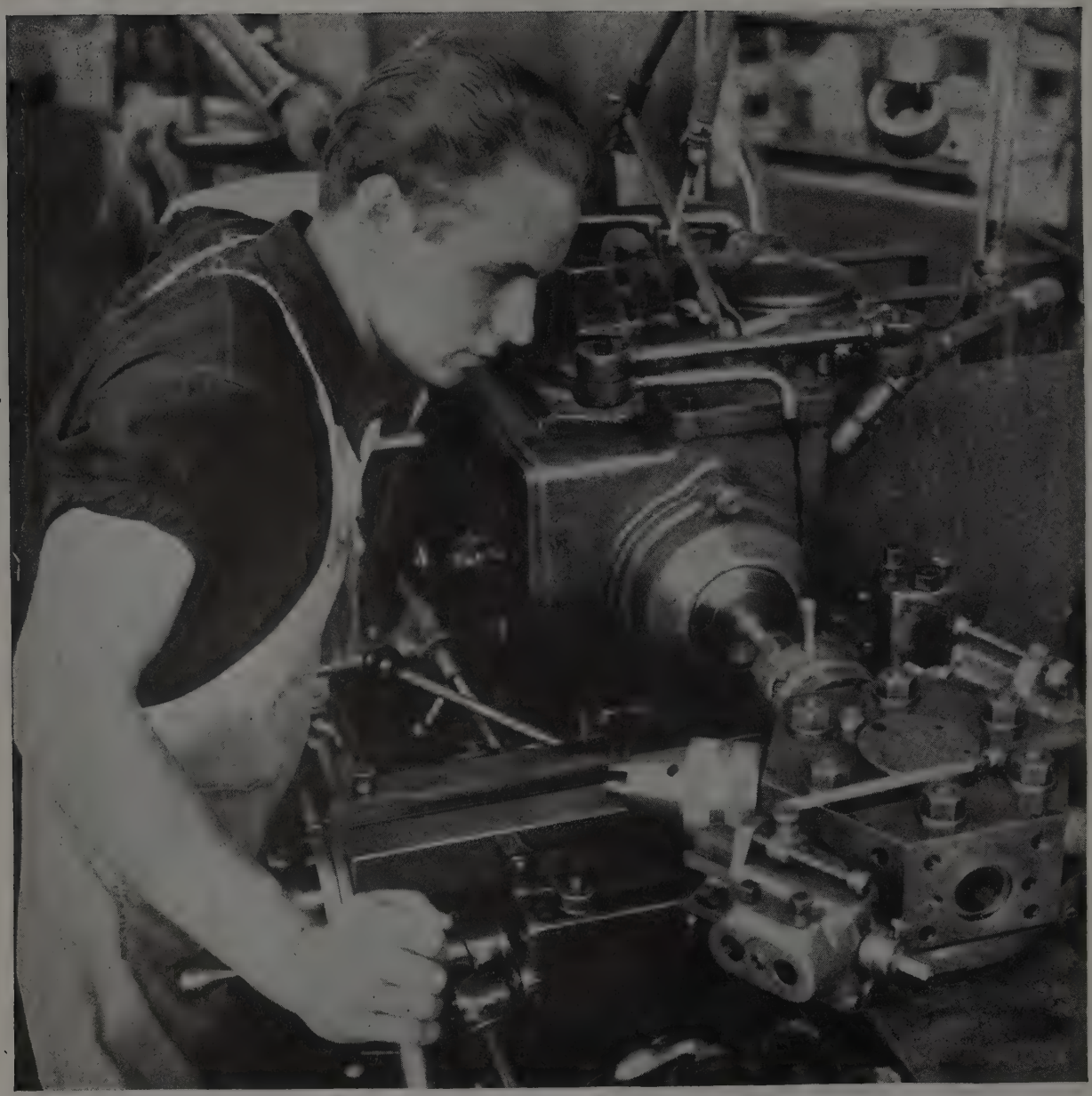
AS INDUSTRY GROWS . . .

Ingalls fabricated steel is the framework for many of the nation's new and expanded manufacturing plants. Steel bearing the Ingalls label is thoroughly dependable. Formed to exact specifications, it requires a minimum of cutting or fitting on the job.

If fabricated steel figures in your construction plans, contact Ingalls at once. We will gladly submit quotations.

THE INGALLS IRON WORKS CO., THE INGALLS SHIPBUILDING CORP., The Steel Construction Co., Birmingham Tank Co. Fabricating plants at Birmingham and Pittsburgh. Shipyards: Pascagoula, Miss., and Decatur, Ala. Offices: BIRMINGHAM, Pittsburgh, New York and New Orleans.

INGALLS
STEEL



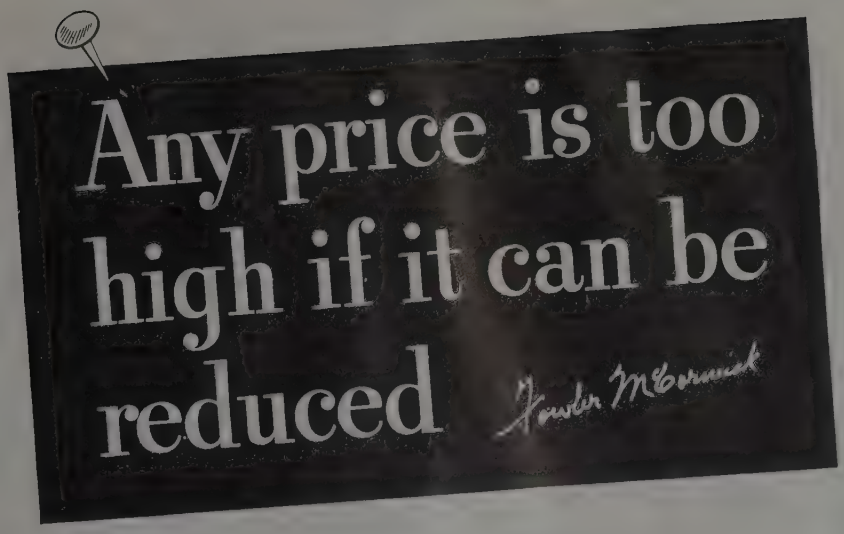
LANDMATIC Hardened and Ground or Heat Treated DIE HEADS

Are Used in Turret Lathe Operations in Most Plants

The few operating parts of LANDIS Die Heads and their precise assembly make it possible to produce threads within extremely close tolerances on a high production basis.

Send for Bulletins describing Landmatic Die Heads

LANDIS MACHINE COMPANY, WAYNESBORO, PENNA., U.S.A.



International Harvester announces $20,000,000 price reductions

We believe there is nothing more important to this country than to lower the prices of the goods that people buy.

The American people have insisted that the government withdraw from its attempts to control prices in peacetime. That places the responsibility where it belongs—in the hands of business and industry. Not all business can reduce prices now. Not all can reduce by the same amount.

Our company has felt a duty to act as promptly as possible. In our case, the business outlook now makes it possible to move toward the goal of lower prices. The only way out of the vicious circle of higher and higher prices is to break through.

We have taken this step not because of present competitive conditions nor because of a drop in demand from customers. We have taken it because of our belief that ANY PRICE IS TOO HIGH IF IT CAN BE REDUCED.

These reductions, which will save the users of our products approximately $20,000,000 a year, will become effective before April 1, and will apply to a selected list of tractor, farm machine, motor truck, and industrial power products. Since we lose money on a few of our products, and barely break even on some others, these reductions will not apply to our entire line. Reductions will be made individually on products. Some will be cut more than others. Exact details will be announced as soon as possible.

IH prices had not gone up as much or as fast as many others

Here are Average Price Increases since 1941

All Manufactured Products... (U. S. Government Reports)	63.7%
Metals and Metal Products... (U. S. Government Reports)	41.2%
IH Motor Trucks.....	35%
IH Industrial Power Products..	34%
IH Farm Machines.....	25%

Our ability to maintain this lower level of prices will depend in part on what happens to the prices and flow of materials that we buy from others. Because we believe price reduction is vital, we are willing to assume the risks that are involved.

These benefits to customers will depend, too, on uninterrupted production at reasonable wage levels. This is not a program that can be carried out if it is hampered by strikes or work stoppages.

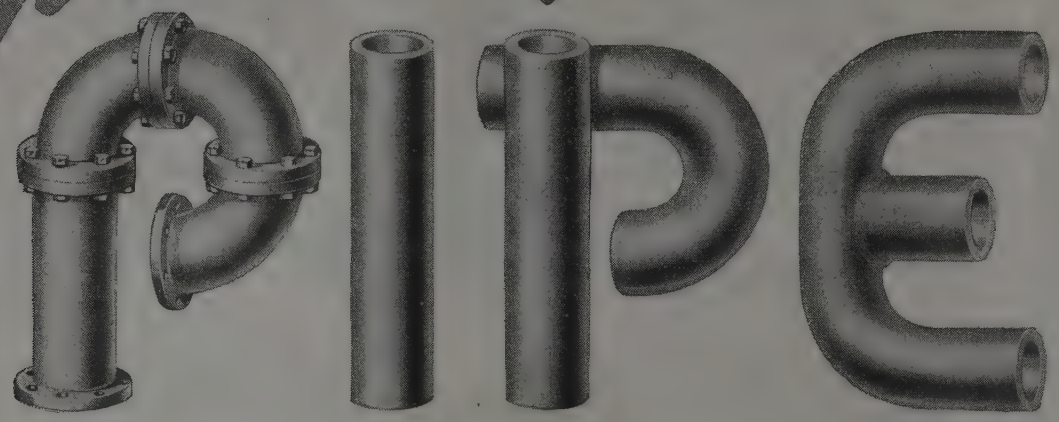
Our employes have had substantial increases in pay, and wage questions are currently being discussed with many of the unions with which we deal. Stockholders have recently had an increase in dividend rate. Having considered the interests of these two groups, we are now making these price reductions for the benefit of the third group—our customers.

Business, to our way of thinking, has a social as well as an economic responsibility. This company has long followed the policy of operating in the interests of three groups—its customers, its employes and its stockholders. The duty of the management is to see that equal justice is done as between the three groups.

This price reduction program is another demonstration of our policy in action.

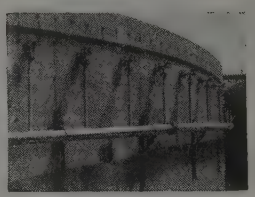
INTERNATIONAL HARVESTER

Go "National" for Lead PIPE



What kind of pipe do you need...to fight acid-corrosion?

1 All-Lead Pipe? National Lead's Chemical Lead Pipe has a long record of successful applications. And there are definite reasons for this. First, it is made of practically pure lead, which is free from bismuth and contains a small amount of copper to increase corrosion resistance. Second, it is fabricated by an extrusion process which assures uniform wall thickness, free flow and freedom from porous or defective spots.



Whatever your problem, National Lead has the lead pipe you need and a full line of fittings to go with it. Here's a lead discharge pipe used on a concrete settling tank.

That's our *regular* lead pipe. It has become "standard" throughout industry. But, maybe you need *extra* corrosion resistance at high temperatures . . . *greater* tensile strength and toughness . . . *higher* endurance to vibratory stress. Our Tellurium Lead Pipe fills the bill there.

Or, maybe your *extra* problem is erosion. Then, you should consider our Antimonial Lead Pipe, made with a base of either Chemical or Tellurium Lead. By adding 6% of antimony we almost double the tensile strength and greatly increase hardness and stiffness.

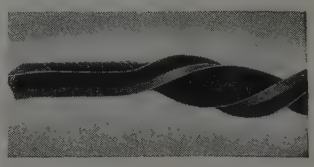
2 Cold Expanded Lead-Lined Pipe? When you need pipe with the strength of iron or steel, we give it to you . . . *with a lead lining.* Our "United" Lead-lined Cast Iron or Steel Pipe has proved highly serviceable under severe conditions. It has the outer strength you need to stand pressure or other mechanical stress; the inner stamina to resist corrosion.

The lead lining is formed in continuous lengths of seamless pipe, then cold expanded against the inside of the iron or steel tube. You get a tight fit and a smooth, uniform lining, free of defects. Of course, all iron and steel pipe used meets ASTM standards.

***The strength of steel** plus the endurance of lead. You get both with "United" Lead-lined Pipe.*

3 "United Tubond" Lead-Lined Pipe? For extremes of temperature, pressure, vacuum or vibration, investigate our "United Tubond" Lead-lined Pipe. This is steel or wrought iron pipe with its lead lining permanently bonded to the ferrous metal. No separation or creep is possible. The illustration below proves the toughness of this bond.

All our lead-lined pipe is available in flanged sections with the lead lining carried over the face of the recessed flange. This insures a positive lead-to-lead joint at each flange, eliminating any danger of leakage.



***Permanently bonded!** Even violent twisting of this section of "Tubond" lead-lined steel pipe couldn't break the bond.*

No Matter What Your Acid-Handling Problem . . .

Go "National" for Lead

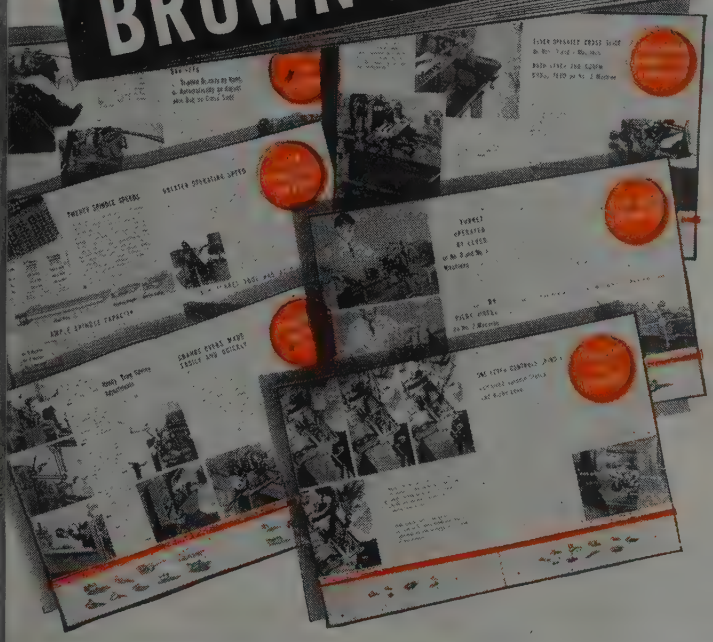
National Lead is ready to consult with you and supply any type of lead pipe . . . valves . . . sheet . . . lead-lined or lead-covered equipment . . . even complete acid recovery plants. And behind every National Lead product . . . every National Lead recommendation . . . are years of experience and many important installations in every field handling corrosive liquids and gases.

NATIONAL LEAD COMPANY
111 BROADWAY, NEW YORK 6, N. Y.
Offices and Plants in Principal Cities and Canada

Modern Profitable WIRE FEED SCREW MACHINES

BROWN & SHARPE

This 32 Page book will show you IMPORTANT PRODUCTION ADVANTAGES



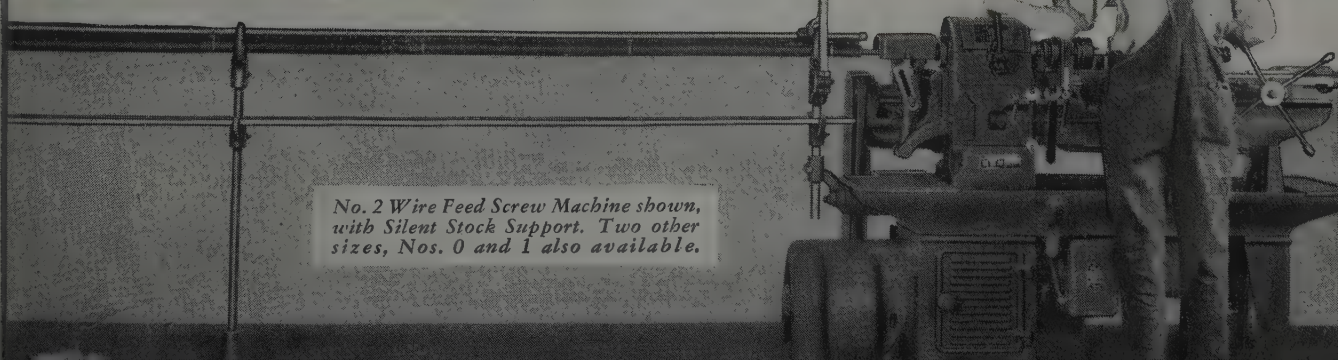
MINIMUM NUMBER OF CONTROLS — waste motion eliminated – operator fatigue reduced – efficiency raised.

SIMPLE TO OPERATE — full control of spindle movement concentrated in single lever – a definite aid to production.

UNUSUALLY RAPID SET-UP — changeovers made quickly – doubly important for short-run or second operation work.

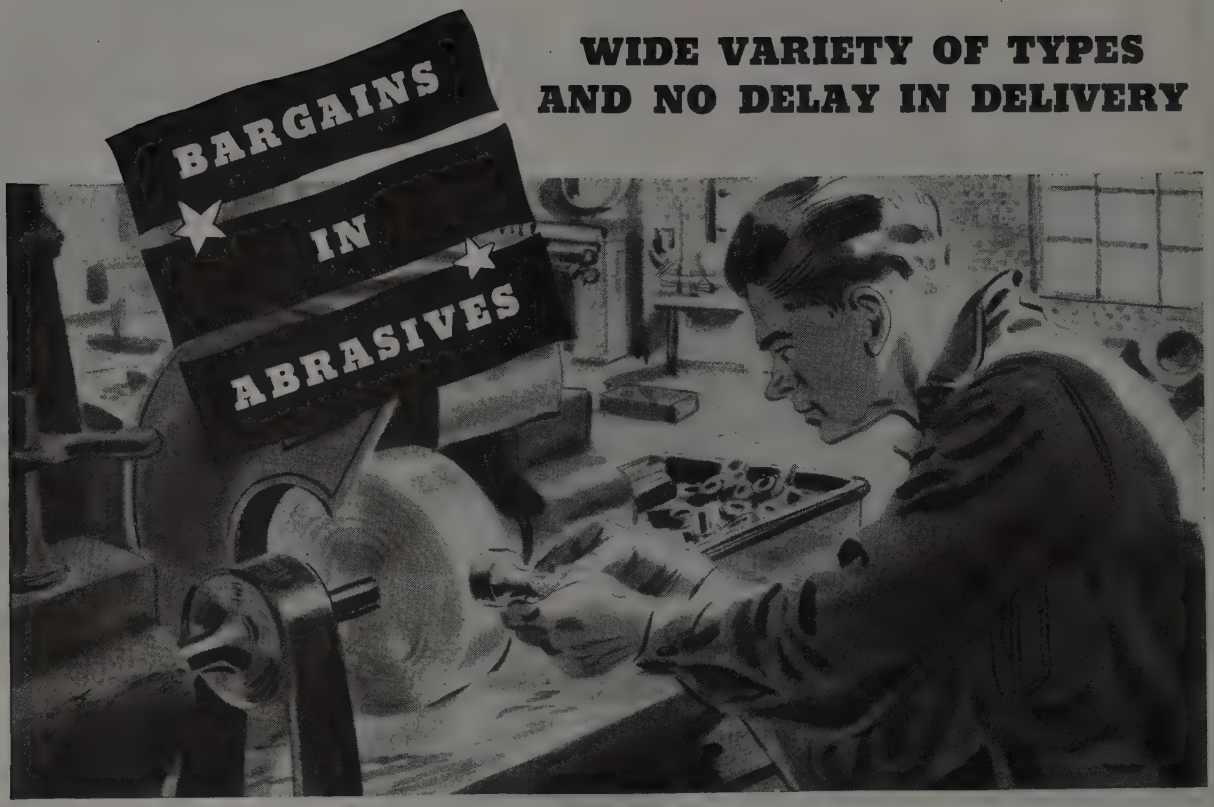
HIGH PRODUCTIVE CAPACITY — obtained by simplified controls, rapid set-up, wide speed range and ample power. Write for copy of this book on Wire Feed Screw Machines. *Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.*

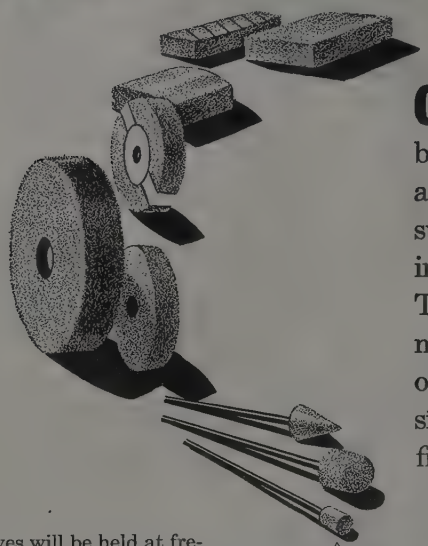
B·S



No. 2 Wire Feed Screw Machine shown, with Silent Stock Support. Two other sizes, Nos. 0 and 1 also available.

WIDE VARIETY OF TYPES AND NO DELAY IN DELIVERY





Grinding wheels—abrasive cloth—paper—belts—stones—sticks and hones—in all sizes and specifications may be had now from WAA surplus stocks. Bids are solicited for approximately $1,000,000 worth of these abrasives. The offering includes both unused and used materials. Delivery can be immediate as priority claims have been satisfied. These abrasives may be inspected at any Regional Office holding the inventory.

Sales of abrasives will be held at frequent intervals. To receive information on future sales, write to the Regional Offices listed below asking that your name be placed on their mailing lists.

BOSTON • PHILADELPHIA • CHICAGO CLEVELAND • DETROIT • ST. LOUIS • LOS ANGELES • NEW YORK • CINCINNATI

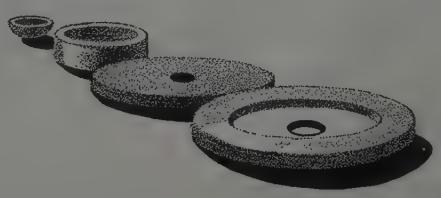
OFFICE OF GENERAL DISPOSAL

WAR ASSETS ADMINISTRATION

GOVERNMENT SURPLUS WAA

Offices located at: Atlanta • Birmingham • Boston • Charlotte • Chicago Cincinnati • Cleveland • Dallas • Denver • Detroit • Fort Worth • Helena • Houston Jacksonville • Kansas City, Mo. • Little Rock • Los Angeles • Louisville • Minneapolis Nashville • New Orleans • New York • Omaha • Philadelphia • Portland, Ore. • Richmond Salt Lake City • St. Louis • San Antonio • San Francisco • Seattle • Spokane • Tulsa

1080



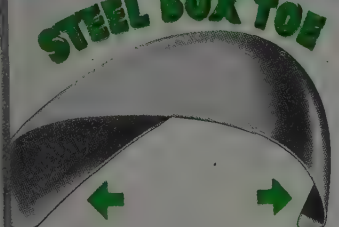
PROTECTION

WHERE NEEDED

H-711—Men's Brown Glove Moccasin Oxford, Leather Sole, Half Rubber Heel.

Insure Workers Feet In Sure Protection with HY-TEST Safety Shoes

ANCHOR FLANGE STEEL BOX TOE



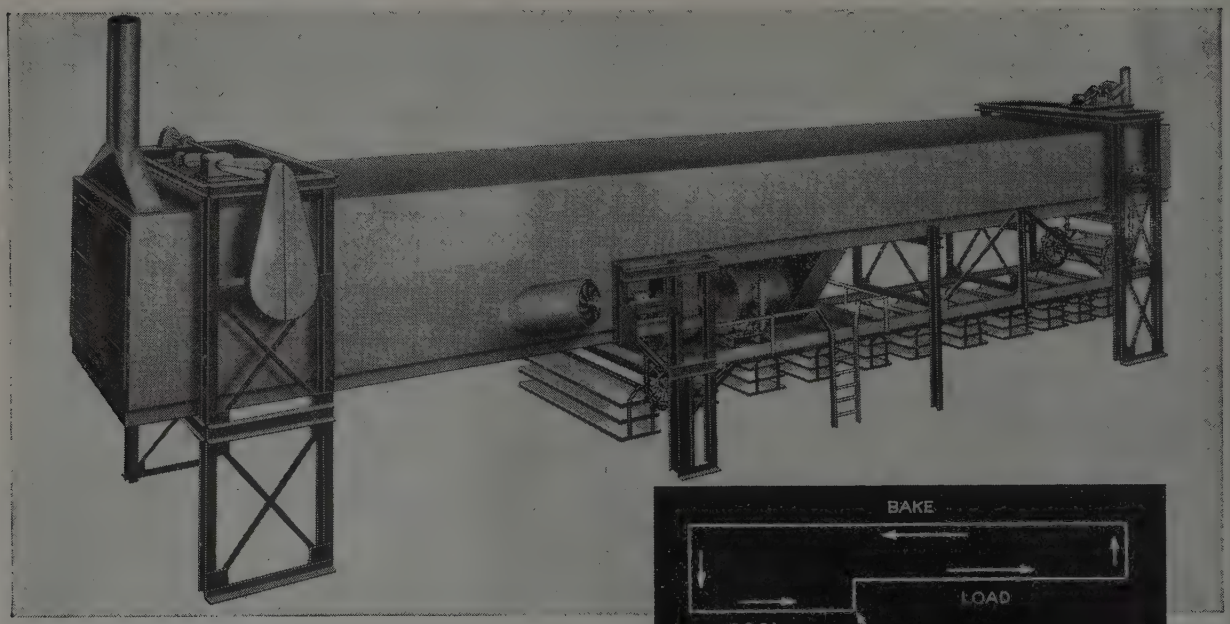
This flange adds extra strength to the steel arch's sidewall. Anchored between insole and outsole, it also serves to resist shifting, tilting and cutting through outsole under impact.

Knights of production lines use modern armor — Hy-Test's Anchor-Flange Steel Box Toes. This armor of steel is built into sturdy leathers to ward off blows that injure toes. And Hy-Test Safety Shoes are a pleasure to wear. They have the new Slant-eze tops and many other comfort features. They're all leather in vital parts . . . strongly built and styled along neat dressy lines. Sizes are 5 to 15 in widths AA to EEE. It's easy for your workers to have them. Let us tell you how.

HY-TEST SAFETY SHOES

HY-TEST Safety Shoes THE WORLD'S LARGEST SELLING SAFETY SHOE

TEST DIVISION • INTERNATIONAL SHOE COMPANY • ST. LOUIS 3, MO. • EASTERN OFFICE • MANCHESTER, N. H.



The time-saving, space-saving, compact design of this new Horizontal Core Oven is characteristic of Young Brothers' Engineering. Into it went the skill and confidence of many years of experience . . . also a thorough knowledge of the job to be done and the production problems involved.

This new core oven can be installed in practically any building without making any major structural changes.

The coremakers are located right next to the oven so that they can load the cores directly on the moving racks thus eliminating the necessity of transporting them on hand trucks or a conveyor from the core room. The location of the coremakers, at the oven, also saves core room space.

The size of the loading racks can be varied and the shelves can be adjusted to accommodate cores of many sizes and shapes.

Besides allowing for the removal of exhaust gases at the point of greatest concentration, the new oven design provides an effective cooling zone for the cores and assures comfortable working conditions for the coremakers.

This New Horizontal Core Oven is Young Brothers' answer to the demand for better core baking equipment. It is YOUR answer to the need for lower production costs and higher operating efficiency.

New HORIZONTAL CORE OVEN . . . . . offers many cost saving advantages!

MANUFACTURER'S ASSOCIATION, INC. FOUNDRY EQUIPMENT MEMBER

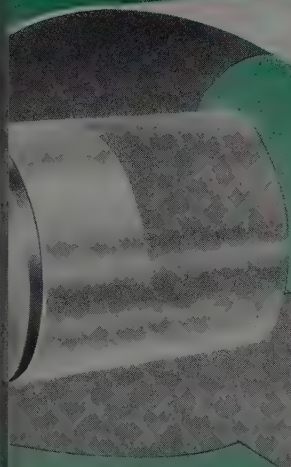
YOUNG BROTHERS COMPANY

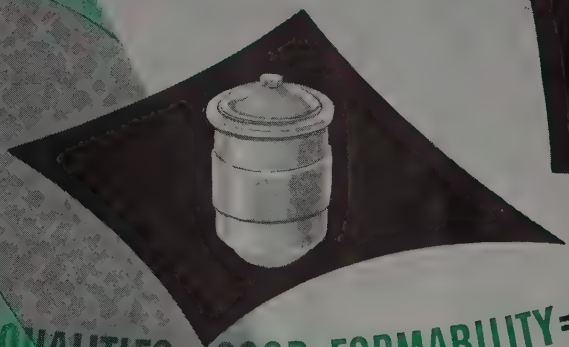
6503 MACK AVENUE DETROIT 7, MICHIGAN

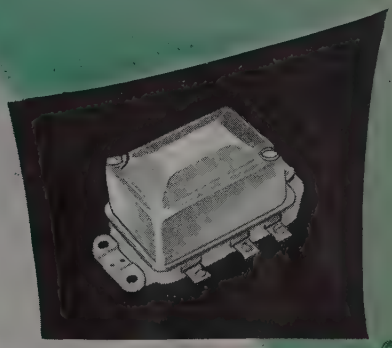
YBC ESTABLISHED IN 1896

WEIRTON

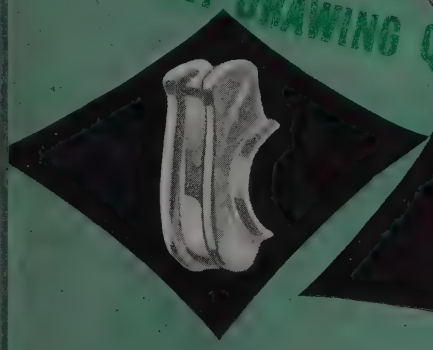
COLD-ROLLED STRIP

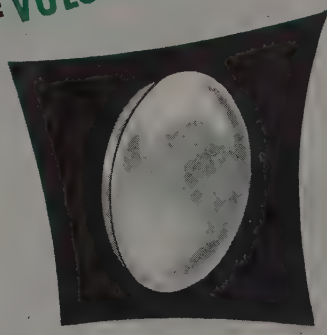






EXCELLENT DRAWING QUALITIES + GOOD FORMABILITY = VOLUME PRODUCTION





The use of Weirton cold-rolled strip steel can be a big factor in maintaining high volume at low cost in the making of countless articles or parts. Production is speeded because Weirton strip possesses exceptional drawing and forming qualities. Costs are cut because spoilage and scrap losses and tool expense are reduced. In short, use Weirton cold-rolled strip to promote plant efficiency.

Also produced in WEIRZIN Electrolytic Zinc-Coated Cold-Rolled Strip

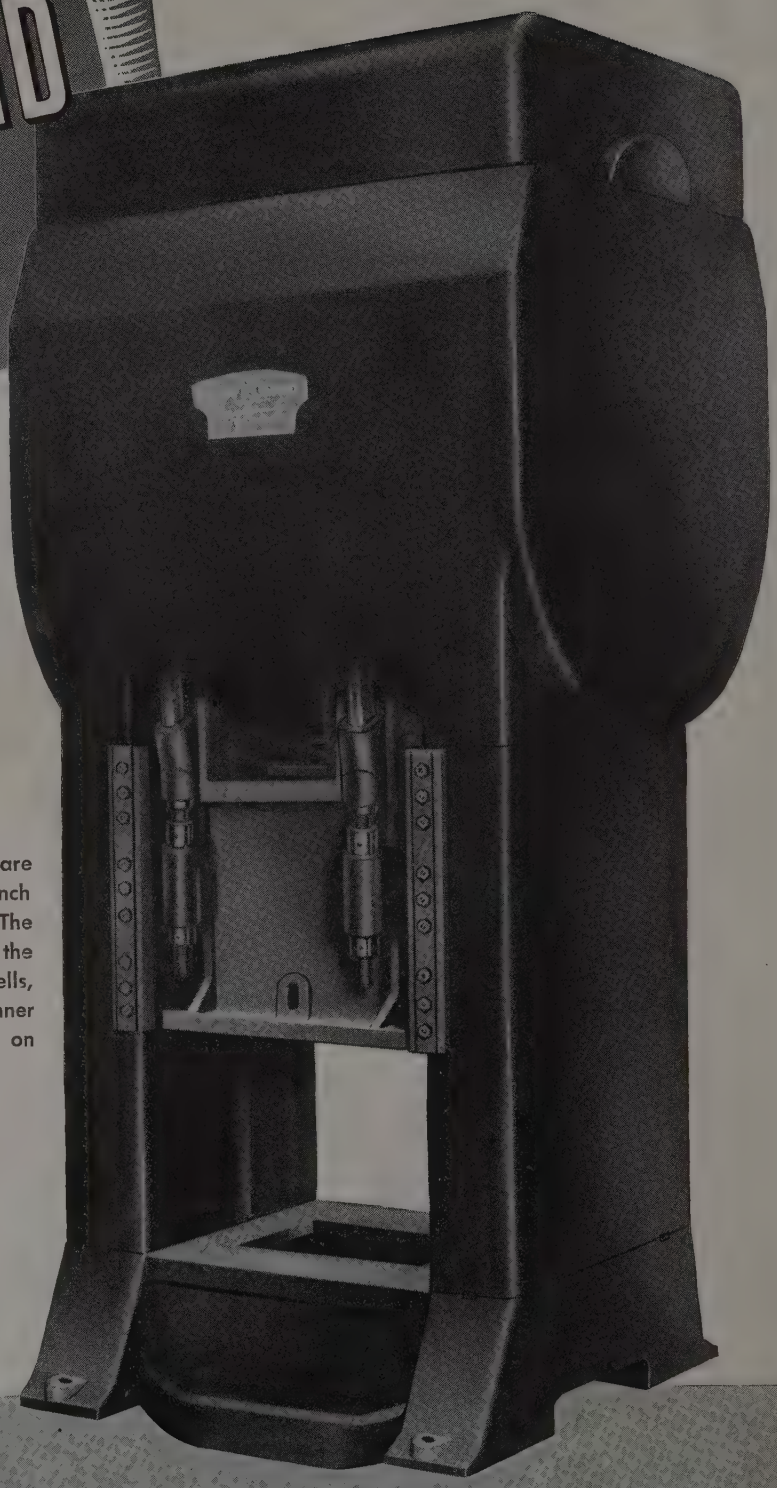
WEIRTON STEEL CO.

WEIRTON, W. VA. *Sales Offices in Principal Cities*

Division of **NATIONAL STEEL CORPORATION** *Executive Offices, Pittsburgh, Pa.*

CLEVELAND

SINGLE POINT Double Action TOGGLE PRESS



- **Modern streamline construction.**
- **Enclosed drive.**
- **No overhanging gears or brackets.**
- **Air (or hydraulic) friction clutch.**
- **Electrical control.**
- **Economy of floor space.**
- **Accessibility for loading and unloading.**

Cleveland Double Action Toggle Presses are equipped with two slides: an inner, or punch slide; and an outer, or blankholder slide. The latter clamps the material firmly before the die on the inner slide takes effect, and dwells, under pressure, on the material until the inner slide has reached a predetermined point on its upward stroke.

While the Press illustrated has a 28" stroke, 6" adjustment, 500 tons capacity for inner slide, 300 tons capacity for outer slide, this type of Press can be furnished in sizes and capacities to suit particular requirements, and with single connection, as illustrated, or two connections, if desired.

MODERN *Presses*

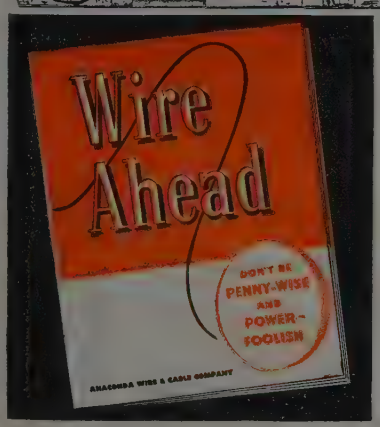
THE CLEVELAND PUNCH & SHEAR WORKS CO.
Cleveland 14, Ohio
New York · Chicago · Detroit · Philadelphia · Pittsburgh

Arrest this Thief!

INADEQUATE WIRING, the industrial jinx, can rob any plant large or small . . . of as much as 25 to 50 percent of rated efficiency. And what's most discouraging, the greater the production load, the deeper he digs into your resources.

Obsolete, overextended, overtaxed wiring may be difficult to detect, but it's too expensive to ignore. You may not be able to see this demon, but your plant power engineer, your consulting engineer, electrical contractor, or utility power salesman *can*. A little policing now may save expensive alterations later.*

47449



*WIRE AHEAD, a new booklet discussing preventive maintenance . . . the symptoms of inadequate wiring . . . and presenting plans for anticipating electrical demand, is now in preparation. We shall be glad to send it on request as soon as it is available. Address Advertising Department, 25 Broadway, New York 4, N. Y.

ANACONDA
from mine to consumer

ANACONDA WIRE AND CABLE COMPANY

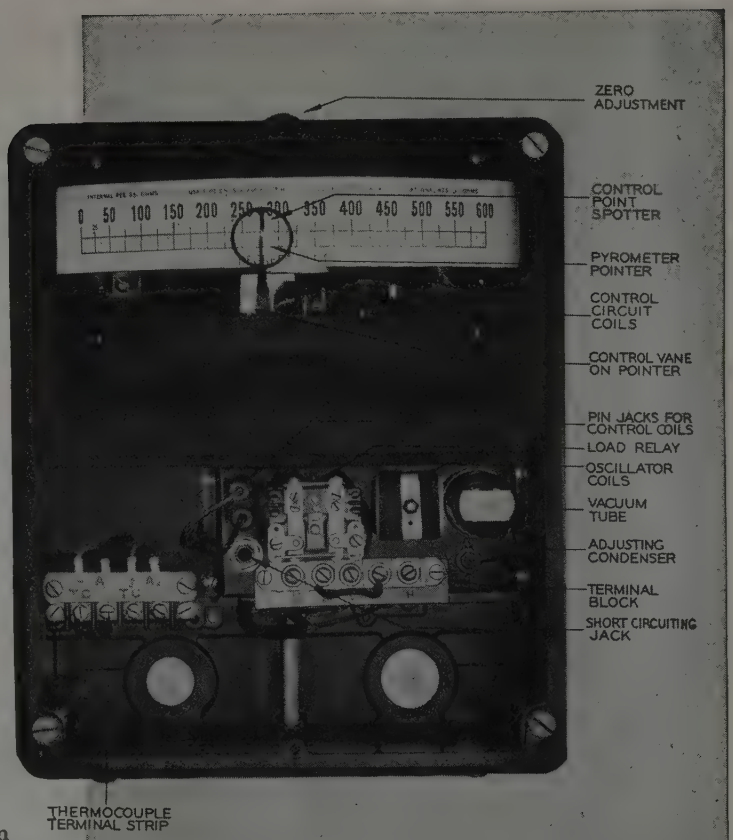
IN "HOT SPOTS"

. . . Electrons are "Quicker on the Trigger"

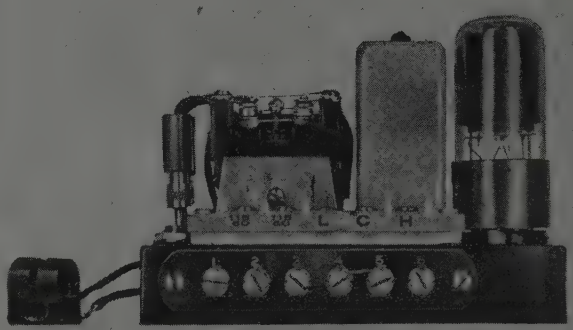
Bristol's Free-Vane Electronic Pyrometer Controller, Model E486, is an up-to-the-minute development for closer automatic temperature-control up to 3600°F. In widespread use on heat-treating and other industrial furnaces, ovens and kilns, this modern, high-quality instrument is simple in construction and positive in action.

CONTROL IS ENTIRELY ELECTRONIC

All moving parts, such as motors, depressor bars, toggle switches and contacts are eliminated from the control circuit. This means long, trouble-free service without maintenance, oiling or daily adjusting. The control unit uses a single high-output vacuum tube; a simple variable-condenser adjustment compensates for normal variations in tube characteristics. Snap-action current change in the relay coil provides extreme sensitivity of control, yet variations in temperature or humidity do not affect accuracy. Measuring elements are the standard, highly accurate types regularly used in Bristol Indicating Millivoltmeter Instruments. Since the pyrometer pointer moves without mechanical engagement, an instant, accurate indication is assured at all times . . . Detailed information is contained in Bulletin PB1217. Address THE BRISTOL COMPANY, 105 Bristol Road, Waterbury 91, Connecticut. (The Bristol Co. of Canada, Ltd., Toronto, Ont. Bristol's Instrument Co., Ltd., London, N.W. 10, England.)



Bristol's Electronic Pyrometer Controller consists of two separate units: the pyrometer unit which measures and indicates the temperature, and the control circuit which opens and closes a relay in the load circuit that regulates the fuel supply. There is no mechanical or electrical connection whatever between the two.



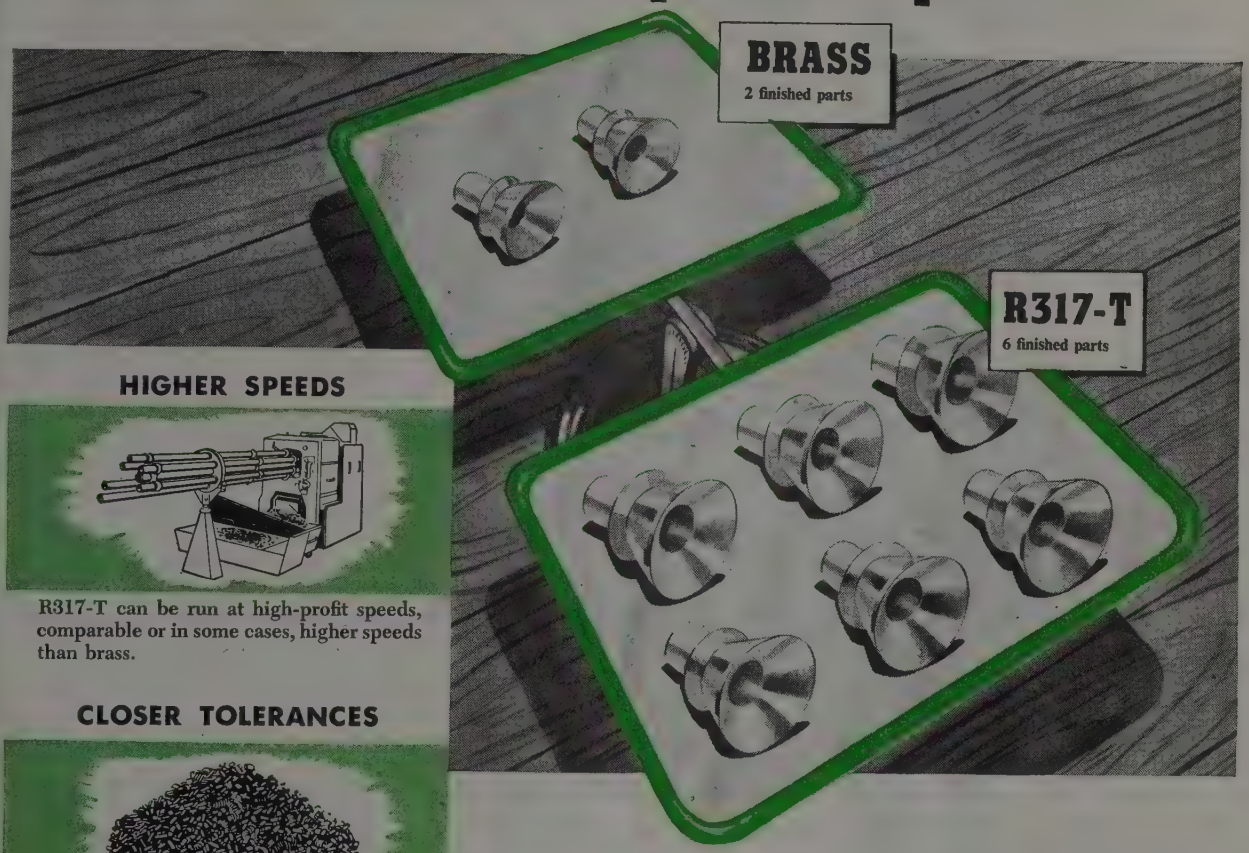
Control unit complete with relay, control coils, vacuum tube — *and not a single moving part.*

BRISTOL

. . . Gives YOU the Most from Heat

POUND FOR POUND...

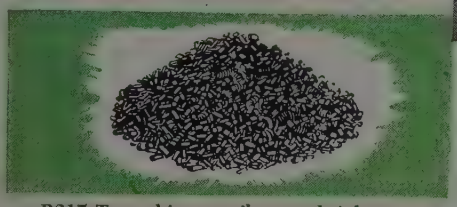
...get 3 times as many finished parts!



HIGHER SPEEDS

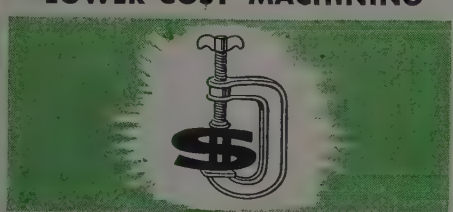
R317-T can be run at high-profit speeds, comparable or in some cases, higher speeds than brass.

CLOSER TOLERANCES



R317-T machines easily to a bright, natural finish. Forms small chips. Does not run with the tool. May be worked to very close limits.

LOWER-COST MACHINING



Accurate volume production with fewer rejects. Result: lower cost, more profit per finished part.

Yes—thanks, to the favorable weight factor aluminum gives you three times as many finished parts per pound as brass.

By the foot you pay less for aluminum than you do for brass. All of which adds up to a saving of about 50% in material cost.

For high speeds, excellent machinability, a bright, natural machine finish and LOWER COSTS, use R317-T, Reynolds new aluminum screw machine stock. Only a fraction of the cost per finished piece as R317-T weighs only ⅓ as much as brass (and other heavy non-ferrous metals).

Order now. R317-T is ready for immediate shipment from Louisville warehouse stock in rounds and hexagons in all standard sizes. 17S-T, Reynolds standard screw machine stock, is also available now.

Consult Reynolds. Reynolds is ready to work with your engineers. Offices in principal cities. Phone nearest office . . . or write Reynolds Metals Company, Aluminum Division, 2520 South Third Street, Louisville 1, Kentucky. See Sweet's or write for Catalog 100-B "Reynolds Aluminum—Available now for Today's Products."

REYNOLDS METALS

REYNOLDS

The Great New Source of **ALUMINUM**

INGOT · SHEET · SHAPES · WIRE · ROD · BAR · TUBING · PARTS · FORGINGS · CASTINGS · FOIL · POWDER

"GENTLEMEN . . .

We're in the same boat you're in!"

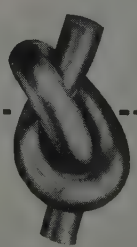
SPEED CASE x1515 STEEL!

A LOW CARBON OPEN-HEARTH PRODUCT

is still scarce because we are waiting on others just as you are waiting on us. We have increased our production but the demand for this steel has surpassed our fondest hopes. Why such a demand? Because SPEED CASE cuts like AISI B1113 at 250 SFPM and has a tensile strength of 80,000-90,000 PSI. It machines 40% to 50% faster than ALL OTHER CASE CARBURIZING STEELS, increases tool life 2 to 5 times and "steps up" production 30% to 100%.

WHILE WAITING . . . *Do This at Our Expense. Write for samples . . . Be ready for SPEED CASE when it's ready for you.*

When you notify us that your samples have arrived we will send our PRODUCTION EXPERT to you. He will show you, in your own plant, how SPEED CASE will improve or maintain the quality of your product and increase your production 30% to 100%.



ACTUAL PHOTOGRAPH

Speed Case Steel (.20 carbon) 1 inch cold drawn bar tied in a knot, cold, without fracture.

Tear off here ATTACH TO YOUR LETTERHEAD AND MAIL TO EITHER COMPANY BELOW.

Licensor

MONARCH STEEL COMPANY

HAMMOND · INDIANAPOLIS · CHICAGO

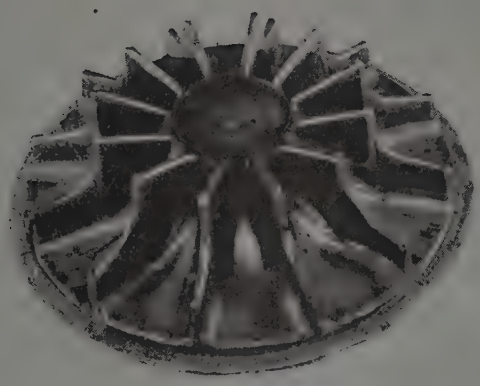
PECKOVER'S LTD., Toronto, Canadian Distributor

MANUFACTURERS OF A COMPLETE LINE OF COLD FINISHED CARBON AND ALLOY STEEL BARS

Licensee for Eastern States

THE FITZSIMONS COMPANY

YOUNGSTOWN, OHIO



IMPOSSIBLE?

This 10″ diameter aluminum supercharger impeller for stratosphere aircraft engines is an "impossible forging" on conventional forging equipment.

On the National Maxipres, however, it is forged with ease. The detail is sharply defined, the physical qualities and finish are excellent and production is unequalled.

It will pay you to investigate the possibilities of the Maxipres.

NATIONAL
MACHINERY COMPANY
TIFFIN, OHIO.

DESIGNERS AND BUILDERS OF
MODERN FORGING MACHINES—MAXIPRESSES—COLD HEADERS—AND BOLT, NUT, RIVET AND WIRE NAIL MACHINERY

New York Detroit Chicago

HALLOWELL

Fig. 732
Drawer is extra.
Patd. & Pats. Pend.

MEMO

TO: Maintenance Managers, Shop Foremen, Purchasing Agents

FROM: Management

SUBJECT: "Hallowell" Shop Equipment of Steel

Be sure to order "Hallowell" Shop Equipment of Steel. We are convinced that this sturdily built, all-steel equipment is what we need. It has welded and hydraulically riveted joints — which means it will never wobble or fall apart. The "Hallowell" Work Benches of Steel come in five heights and seven lengths — and so they can be arranged to any length or height we need. The stools come in heights from 18" to 30" — this will provide the right height stool for each worker.

And don't forget the "Hallowell" Tool Stands of Steel — or the "Hallowell" Trucks of Steel with those free-rolling casters.

Make our shop the most modern, efficient and up-to-date shop in town, with "Hallowell" Shop Equipment of Steel.

"Unbrako" and "Hallowell" Products are sold entirely through distributors.

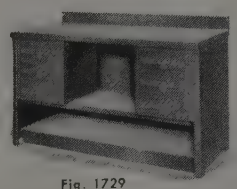


Fig. 1729

Fig. 200 M

Fig. 200 M.H.B.

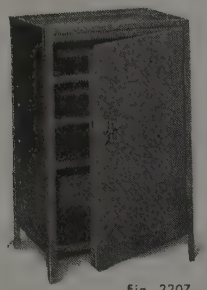


Fig. 2207

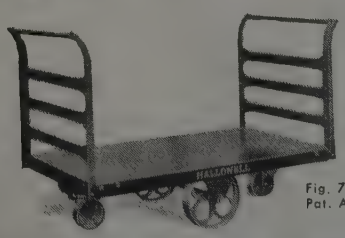


Fig. 769
Pat. Applied for.

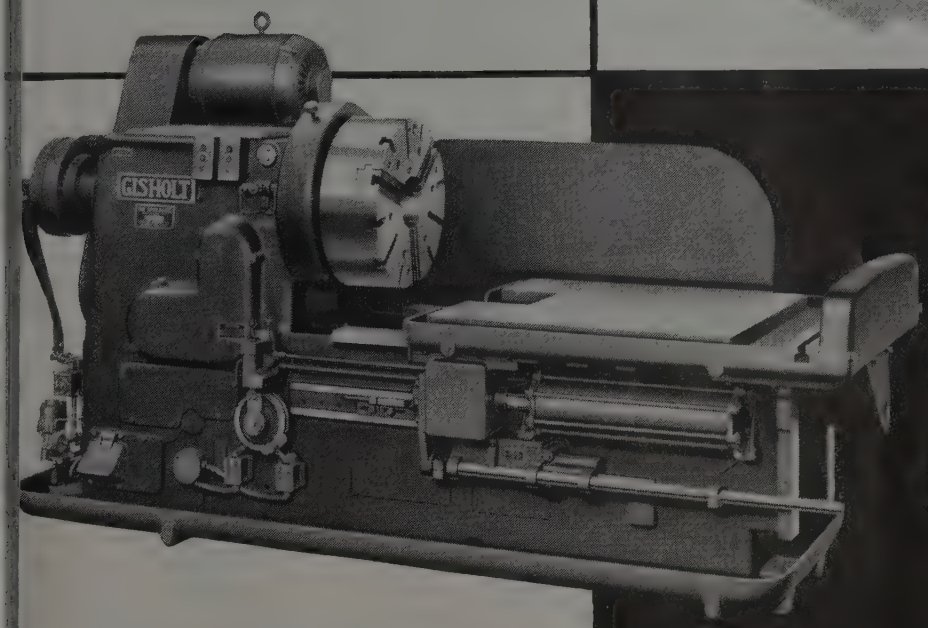
HALLOWELL

Over 44 Years in Businesss

STANDARD PRESSED STEEL CO.

JENKINTOWN, PENNA., BOX 379 • BRANCHES: BOSTON • CHICAGO • DETROIT • INDIANAPOLIS • ST. LOUIS • SAN FRANCISCO

before you build a Special Machine . . .



investigate the SIMPLIMATIC

PERHAPS you won't have to invest in special equipment after all. For the surprising range of machining problems which the Gisholt Simplimatic solves may include some of your problems, too.

Simple in its basic design, the Simplimatic is a machine which may be individualized for high production on many jobs—with full utilization of the base machine.

The answer to your problem may be found in the wide variety of slide positions possible on the large platen table. Or perhaps through the addition of a tailstock for between-centers work. With a linkage arrangement between slides it will handle spherical boring in conjunction with facing and turning. A vertical head, instead of the horizontal platen, may serve your need. Or you can even set it up for simultaneous double end machining.

Users everywhere are taking advantage of the Simplimatic's varied possibilities to get production on many common and "special" machining jobs. If you have large volume work, where automatic machining can cut costs, investigate the highly adaptable Simplimatic before you have special machines built.

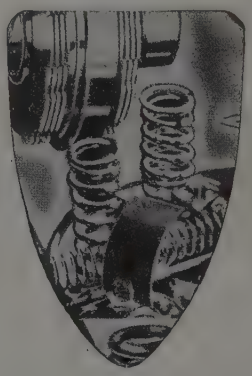
GISHOLT MACHINE COMPANY
Madison 3, Wisconsin

THE GISHOLT ROUND TABLE
represents the collective experience of leading specialists in the machining, surface finishing and balancing of round and semi-round parts. Your problems are welcomed here.

TURRET LATHES · AUTOMATIC LATHES · BALANCERS · SUPERFINISHERS · SPECIAL MACHINES

A Little "IRONING" That's Long Overdue!

Now that we're approaching the good old days of sell and deliver, why not "iron out" the flaws in those backward numbers? Simply changing to a different material may easily do it. Better ductility, greater rust resistance, cleaner machining, finer finish, more resilience, firmer joints—any one of such improvements can boost a slow seller into first place over night! In this respect, we suggest you get closely acquainted with the SEYMOUR products described below.



LET THIS "BIG 4" HELP IRON OUT DESIGN & PRODUCTION TROUBLES!

SEYMOUR NICKEL SILVER

A wide ductility range makes it the perfect alloy for spinning and drawing.

Its silvery white color makes it an excellent base for plated ware.

Has the ideal uniform grain for the etching process.

Leaded for free cutting, it has unsurpassed workability.

SEYMOUR PHOSPHOR BRONZE

High corrosion resistance solves most salt water and dampness problems.

Remarkable fatigue resistance.

Fine resilience, producing springs of almost endless life.

Extreme toughness makes it highly dependable for small bearings.

SEYMOUR NICKEL ANODES

Made of virgin nickel electrically melted.

Cast under accurate pyrometric control and constant laboratory check.

Special grain structure reduces sludge and loose nickel. Made in all standard shapes and formulas. Special anodes to order.

SEYMOUR PHOSPHOR BRONZE WELDING RODS

For homogeneous welds of high tensile strength. Clean melting, good penetration.

Result of over 60 years in the manufacture of nonferrous alloys.

In grades A, C and D at most welding supply houses.

REMEMBER THE NAME—

SEYMOUR

THE SEYMOUR MANUFACTURING COMPANY, SEYMOUR, CONN., U.S.A.

NONFERROUS ALLOYS SINCE 1878

FLOOR SPACE: 16 SQUARE FEET

Announcing the 3-U SPEED-FLEX AUTOMATIC TURRET LATHE

the latest Potter & Johnston development

I It has the necessary power and high speed demanded by carbide tooling, plus required rigidity and strength.

II Speed and efficiency of machine reduces cost per piece, despite greatly increased hourly pay of operator.

III Electro-pneumatic speed control; split second timing on change from rapid traverse to working speed and vice versa.

IV Versatility of tooling. Six turret faces are provided for the mounting of tools; turret is of liberal dimensions.

V Minimum floor space (16 sq. feet) in relation to capacity of machine. This economy is important in planning the production line.

P&J

POTTER & JOHNSTON MACHINE COMPANY

PAWTUCKET, RHODE ISLAND

LODGE & SHIPLEY LATHES *at work*

● **A graphic demonstration of the versatility of Lodge & Shipley Lathes is this shaft production job in the plant of a noted machine tool builder. The forged shaft is rough turned, heat treated and finally finish turned on the 20" Lodge & Shipley Lathe shown.**

Lathe operations include: Turn, face, drill, tap, chase and recenter . . . performed in minimum times, utilizing a wide range of feeds and speeds.

Reports from owners prove that the new series of 18 and 20 inch Lodge & Shipley Lathes are outstanding in every detail . . . on every machining operation. New from pulley to tailstock, they offer many important advantages over older lathes . . . often replace several worn and weary tools.

Lodge & Shipley Engineers will gladly demonstrate, with actual production and cost figures, just how much these new lathes can save you. Write on your company letterhead for Bulletins Nos. 503 and 606.

KNOWN THE WORLD OVER FOR GOOD LATHES ONLY

THE **Lodge & Shipley** COMPANY

CINCINNATI 25, OHIO

MACHINE TOOL DIVISION • 3055 COLERAIN

SPECIAL PRODUCTS DIVISION • 800 EVANS ST.

WHY BUILD IT UP?

Buy an Extruded Shape, READY-TO-USE

You save material and labor when you order an aluminum extruded shape that fits your design. No need to build it up from angles, channels, tees, and other conventional shapes.

The aluminum in an extruded shape is used at maximum efficiency . . . strength where strength is needed, economy of metal where loads are light. No lap joints and double thicknesses to rivet through, no extra rivets to add weight.

Die charges for extruded shapes of your own design are much less than you'd think.

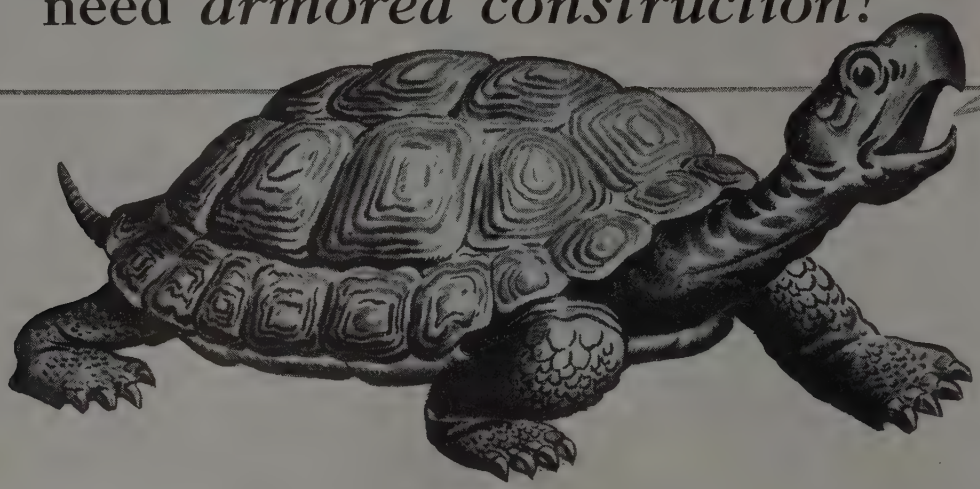
Our engineers will be glad to help you adapt Alcoa Aluminum Extruded Shapes to the things you make. ALUMINUM COMPANY OF AMERICA, 2112 Gulf Building, Pittsburgh 19, Pennsylvania. Sales offices in leading cities.

***MORE** people want **MORE** aluminum for **MORE** uses than ever.*

ALCOA FIRST IN **ALUMINUM**

IN EVERY COMMERCIAL FORM

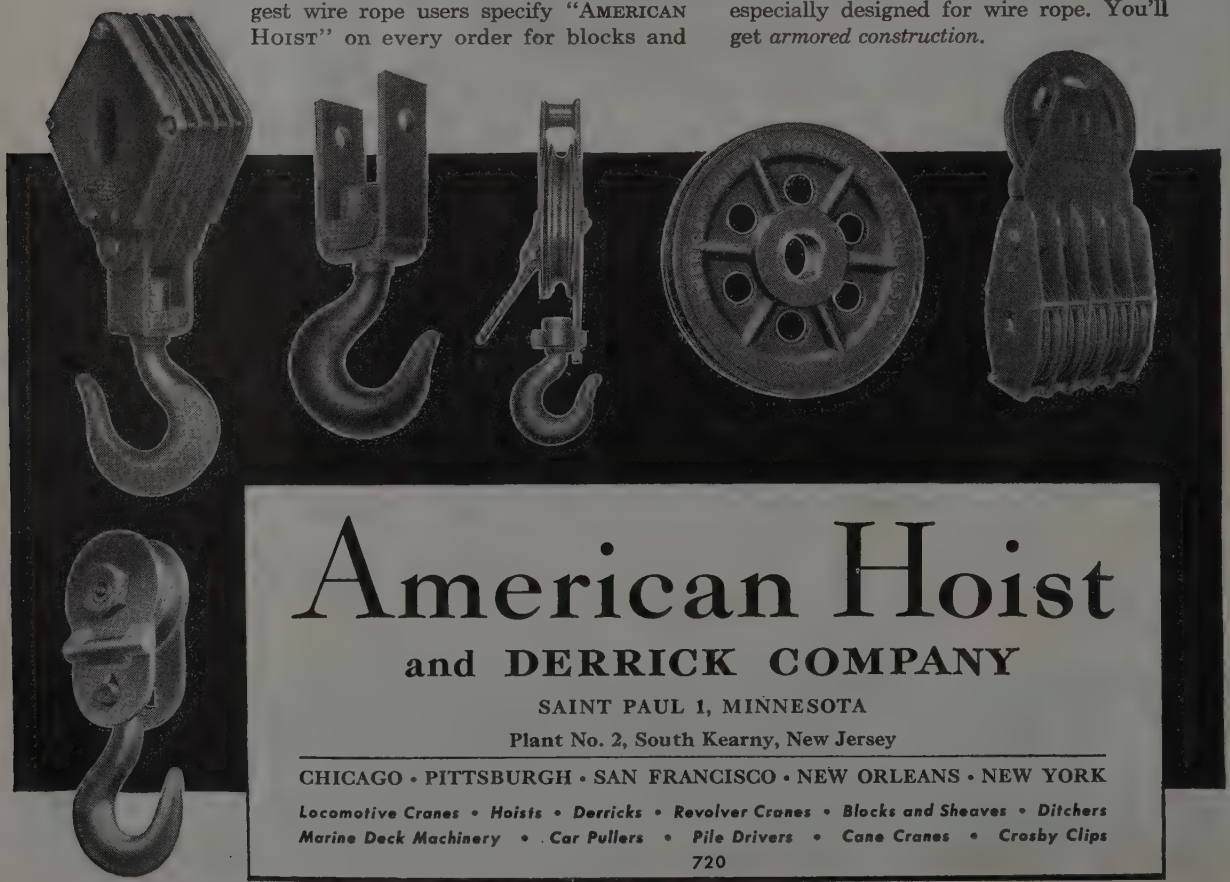
Blocks and sheaves, too, need *armored construction!*



If you have to take a beating, it pays to be tough! And blocks and sheaves *do* take a beating. Slammed against steelwork, battered by sudden drops, exposed to the elements, dragged through sand and mud, they're either tough—or else!

That explains why so many of the biggest wire rope users specify "American Hoist" on every order for blocks and sheaves. For we give you *armored construction.* That means extra thick side plates and reinforcing straps—oversize pins and axles—hooks and shackles of tough forged steel.

Here's a practical suggestion: Specify "American Hoist" blocks and sheaves on every order. You'll get rugged equipment especially designed for wire rope. You'll get *armored construction.*



American Hoist

and DERRICK COMPANY

SAINT PAUL 1, MINNESOTA

Plant No. 2, South Kearny, New Jersey

CHICAGO • PITTSBURGH • SAN FRANCISCO • NEW ORLEANS • NEW YORK

Locomotive Cranes • Hoists • Derricks • Revolver Cranes • Blocks and Sheaves • Ditchers
Marine Deck Machinery • Car Pullers • Pile Drivers • Cane Cranes • Crosby Clips

720

PORTABLE HORIZONTAL DRILLING and TAPPING MACHINE

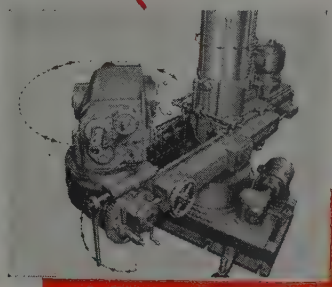
Featuring Compound Head Movement

NEW DRILLS, TAPS and SPOT FACES

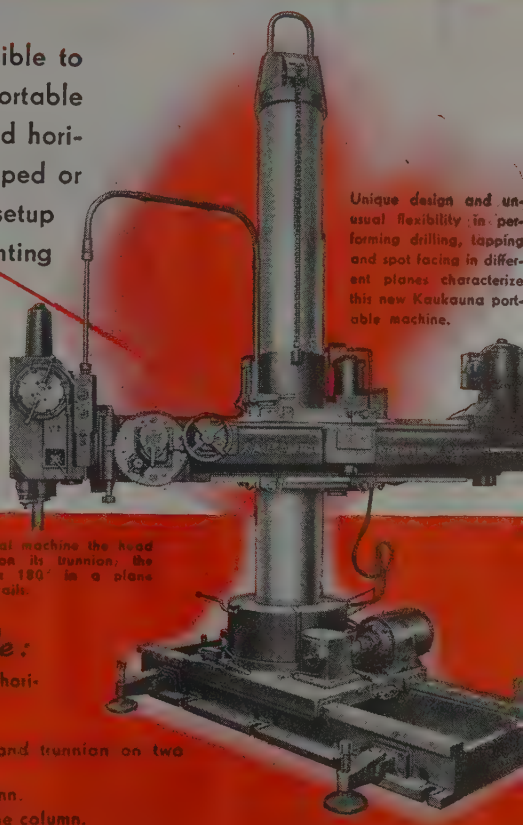
MULTIPLE SURFACES IN A SINGLE SETUP

ugh compound swivel movement of the machine head, it is possible to tion tools in any conceivable angle with the *new* Kaukauna Portable izontal Drilling and Tapping Machine. Thus, angular, vertical and hori- al surfaces of any casting or weldment may be drilled and tapped or faced. In many instances, it is necessary only to make one setup ause of the flexible machine movements which simplify presenting cutting tool to the work.

one setup is required to complete all drilling, g and spot facing operations on this casting.



On this universal machine the head rotates 360° on its trunnion; the trunnion swivels 180° in a plane parallel to the rails.

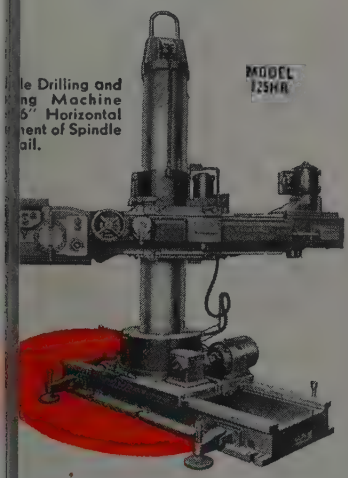


Unique design and unusual flexibility in performing drilling, tapping and spot facing in different planes characterize this new Kaukauna portable machine.

These movements include:

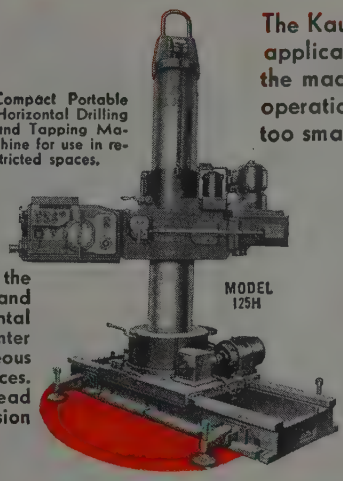
1. Complete rotation of the head in either the horizontal or vertical plane.
2. 180° swivel of the head on its trunnion.
3. 24" horizontal adjustment of the head and trunnion on two sliding rails.
4. Complete rotation of head, rails and column.
5. Vertical movement of head and rails on the column.
6. Traverse movement of the complete column assembly on its runway.

With these motions, limitless new drilling and tapping possibilities are opened by the *new* machine.



le Drilling and ng Machine 6" Horizontal ent of Spindle ail.

aukauna Model 125-HR drilling and ng machine is unequaled for repetitive tions on various workpieces whose es can be placed at right angles to the ne spindle. By combining 12" spindle and ail movements, a total of 36" horizontal ment is obtained radially from the center column. This is particularly advantageous illing and tapping hard-to-reach surfaces. rigidity is obtained by advancing the head e workpiece. Thus, the need for extension s and holders is eliminated.

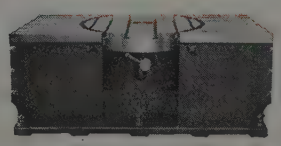


Compact Portable Horizontal Drilling and Tapping Machine for use in restricted spaces.

The Kaukauna Model 125-H machine is better suited to individual applications where the range of performance is secondary. Because the machine is very compact in design, many drilling and tapping operations can be completed in restricted and cramped areas too small for the Model 125-U or 125-HR machines.

COMBINATION INDEXING AND STATIONARY TABLE

gives you



1. Increased working range for many types of machine tools.
2. Single or multiple work settings at any location.
3. Fast, accurate indexing of work for consecutive operations.

For machining operations, inspection and layout work, this 3' x 6' x 28" high, convenient indexing and stationary table permits a profitable increase in work range. T-slots are provided on top and end surfaces, permitting the table to be used as an angle plate.

KMC **Kaukauna** MACHINE CORPORATION
KAUKAUNA, WIS., U.S.A.

Send Now FOR FREE CATALOG
descriptive of profit producing Kaukauna

Cost Savings

...by the million

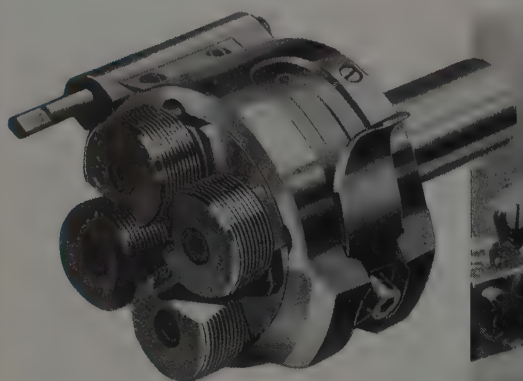
Save half a second on each of a million parts and you save about 140 hours of machine time.

And in these times of high material costs and high hourly wage rates, second-splitting is a must. For time is the one controllable factor.

Our files have thousands of actual examples of 20% to 70% savings in threading time by Vers-O-Tools, on long runs of identical parts.

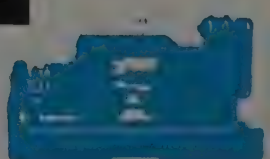
In each case, the time savings have an important bearing on either final selling prices or net profits—often both.

Tell us what kind of threaded parts you make in quantity and we'll give you evidence of what has been done on similar work.



The brass part above was threaded at The Inland Mfg. Co., Chicago, with Circular Chasers at the rate of 1309 per hour—2.75 seconds per part—a convincing example of cost reduction on a long-run job. Chasers, after threading 353,000 parts, showed practically no wear.

This Namco Vers-O-Tool Style DBS Head, with ground thread Circular Chasers, is made especially for Brown & Sharpe Automatics. Similar equipment is available for threading, or end-forming and turning, on all types of production machines.



THE NATIONAL ACME COMPANY

170 EAST 131st STREET • CLEVELAND 8, OHIO

ACME-GRIDLEY BAR and CHUCKING AUTOMATICS
Maintain accuracy at the highest spindle speeds and fastest feeds modern cutting tools can withstand.

Fabricators like to work with

WORTH

STEEL PLATES
FLANGED AND DISHED HEADS

for accuracy,
uniformity,
fine quality

WORTH STEEL COMPANY · Claymont, Delaware

HOUGHTON'S ANTISEP

...the oil that's changing cutting fluid standards

Here's why:

1. It's antiseptically treated — combats skin irritations, prevents rancidity arising from bacterial growth.
2. It has remarkable wetting and cleansing power — no gumming of machines, lines or reservoirs.
3. It makes a permanently stable emulsion with water.
4. It protects against rusting of work or tools.
5. It prevents blueing or burning of work . . . no loading of grinding wheels.
6. It also does the conventional jobs claimed for all oils — providing longer tool life and better work finish.
7. It's economical, because it permits higher dilutions and has a longer usable life.

For those many reasons, Antisep Soluble Oil is rapidly becoming the first choice of machine tool operators and management. To test it in your plant, write E. F. HOUGHTON & CO., 303 W. Lehigh Ave., Philadelphia 33, Pa.

Color Dynamics
Pittsburgh's scientific use of the energy in color improves working conditions . . . reduces eye fatigue, absenteeism and accidents . . . helps to maintain the quality and quantity of production.

PINAUD, INC., Utilizes Energy in Color in the Making of Fine Toiletries!

IT IS not surprising that management and workers in plants which make durable goods should be benefited by Pittsburgh's COLOR DYNAMICS.

Similarly, actual experiences in industries which manufacture soft or light products disclose that this new painting system likewise affects the well-being and safety of employees and the quality and quantity of their output.

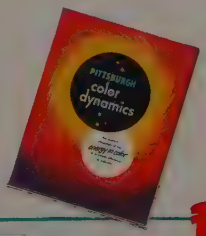
Characteristic of such advantages are the results in the New York plant of Pinaud, Inc., internationally prominent manufacturers of men's and women's toiletries and cosmetics.

By the use of proper *focal* and *eye-rest* colors, eye fatigue, so often the cause of physical fatigue and lowered efficiency, is lessened. In place of dull, non-reflecting surfaces, *morale-building* colors improve the employee's mental attitude. The improvement in appearance also lessens housekeeping problems.

Such consequences are typical everywhere that COLOR DYNAMICS is used. Because the principles of COLOR DYNAMICS are based upon the physical, mental and nervous reactions of normal human beings to the *energy in color*.

Pittsburgh has worked out special methods to utilize this energy on every paintable surface—walls, ceilings, floors and equipment. Test these principles in your plant by trying COLOR DYNAMICS on a machine or two or in one of your departments. See the difference it makes in health, efficiency, safety and morale and in the kind and volume of output.

Write for a FREE copy of our new booklet which explains clearly the principles of COLOR DYNAMICS and contains full-color examples of installations in many industries. Pittsburgh Plate Glass Co., Paint Div., Dept. ST-4, Pittsburgh, Pa.



Paint RIGHT with Color Dynamics Paint BEST with Pittsburgh Paints!

The benefits of COLOR DYNAMICS are made more enduring when you use Pittsburgh long-lasting, high-quality paints. There's a Pittsburgh Paint for every industrial need.

WALLHIDE—available in three types: **PBX**—extra durable finish can be washed frequently without streaking or spotting; **SEMI-GLOSS**—with higher sheen; **FLAT**—a velvet-like finish that is beautiful and restful. These paints are enriched with Pittsburgh's exclusive "*Vitolized Oils*" which keep film *live*, tough, elastic.

WATERSPAR ENAMEL—for woodwork, furniture or metal trim. Brushes out to a smooth, gleaming surface that resists marring and abrasion.

FLORHIDE—for floor surfaces. Quick-drying, tough, can be scrubbed frequently with soap solutions.

LAVAX MACHINERY ENAMEL—a tough, durable finish which is impervious to oil, grease, grime or dirt.

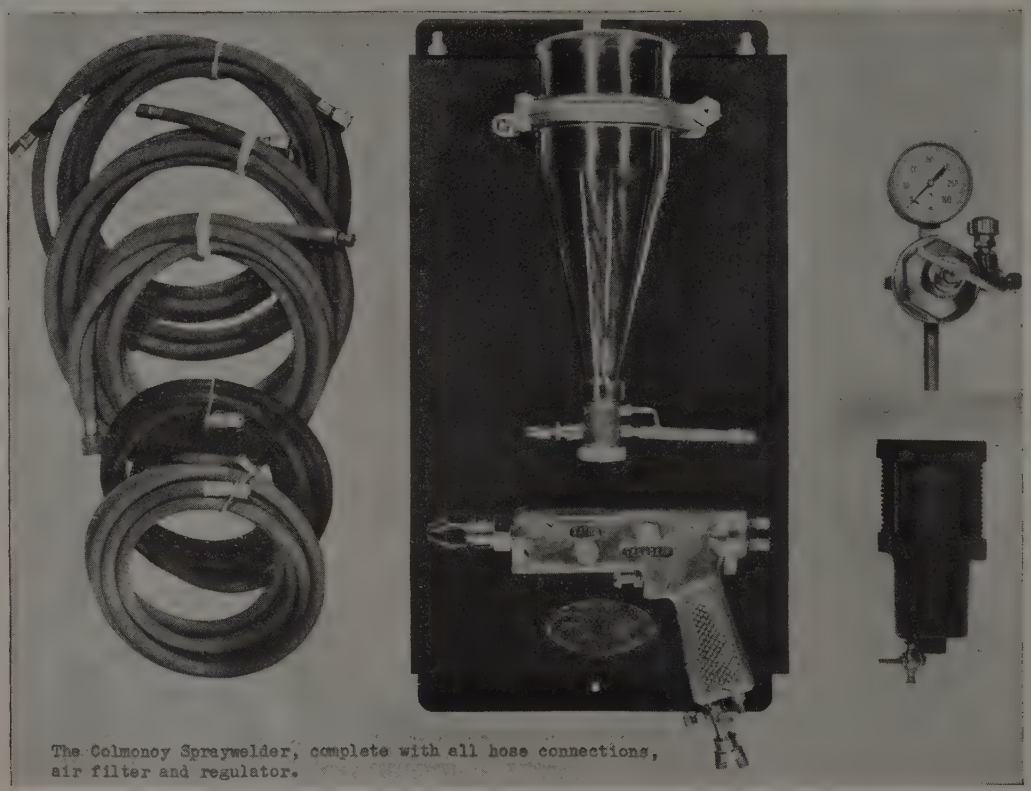
PPG

PITTSBURGH PAINTS

PITTSBURGH PLATE GLASS COMPANY, PITTSBURGH, PA.

PITTSBURGH STANDS FOR QUALITY PAINT AND GLASS

Here's The New COLMONOY SPRAYWELDER



The Colmonoy Spraywelder, complete with all hose connections, air filter and regulator.

Here's What It Will Do—

1. Spray and bond Colmonoy No. 6 to steel, stainless steel, copper, etc. (Colmonoy No. 6 outwears hardened steel from 3 to 25 times, has greater corrosion resistance than stainless steel, and in addition is non-sparking and non-magnetic.)
2. Spray and bond tin-lead solders.
3. Use it as a powder metallizing unit to apply coatings of brass, copper, zinc, lead, nickel, stainless steel, silver solder, aluminum and other alloys.

WRITE

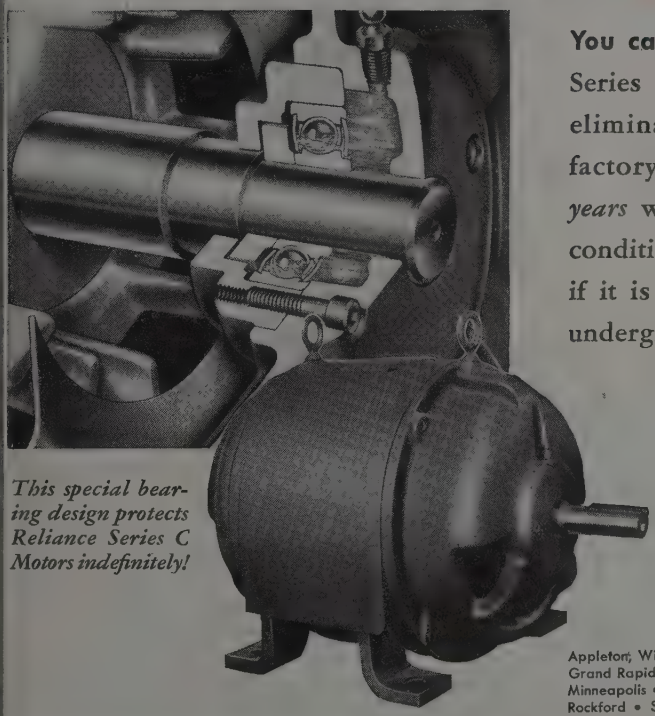
For name of nearest office or sales representative

WALL COLMONOY CORPORATION

7TH FLOOR FISHER BLDG., DETROIT 2, MICH.

NO MORE LUBRICATION WORRIES!

...thanks to RELIANCE *Series C* MOTORS



This special bearing design protects Reliance Series C Motors indefinitely!

You can't grease 'em wrong! That's because Reliance Series C Motors are designed and precision built to eliminate lubrication worries. In most uses, these factory-lubricated motors perform dependably *for years* with no additional lubrication. Where unusual conditions make occasional attention necessary—or if it is your practice to lubricate at regular intervals—undergreasing or overgreasing can make no difference.

Send coupon below for the whole story of how Reliance Series C Motors end your lubrication worries!

RELIANCE ELECTRIC & ENGINEERING CO.

1081 Ivanhoe Road **Cleveland 10, Ohio**

Appleton, Wis. • Birmingham • Boston • Buffalo • Chicago • Cincinnati • Denver • Detroit • Gary Grand Rapids • Greenville, S. C. • Houston • Kansas City • Knoxville • Los Angeles • Milwaukee Minneapolis • New Orleans • New York • Philadelphia • Pittsburgh • Portland, Ore. • Roanoke, Va. Rockford • St. Louis • San Francisco • Seattle • Syracuse • Tampa • Tulsa • Washington, D. C. Sao Paulo, Brazil

RELIANCE A-C D-C MOTORS

RELIANCE ELECTRIC & ENGINEERING COMPANY
1081 Ivanhoe Road
Cleveland 10, Ohio

Please send me your Bulletin C-118 which explains the advantages of Reliance Series C Motors.

NAME..... TITLE.....

COMPANY .....

ADDRESS.....

CITY..... ZONE..... STATE.....

Welds are FASTER BY TEST

BETTER BY FAR with P&H DH-2

(Class AWS-ASTM E6020)

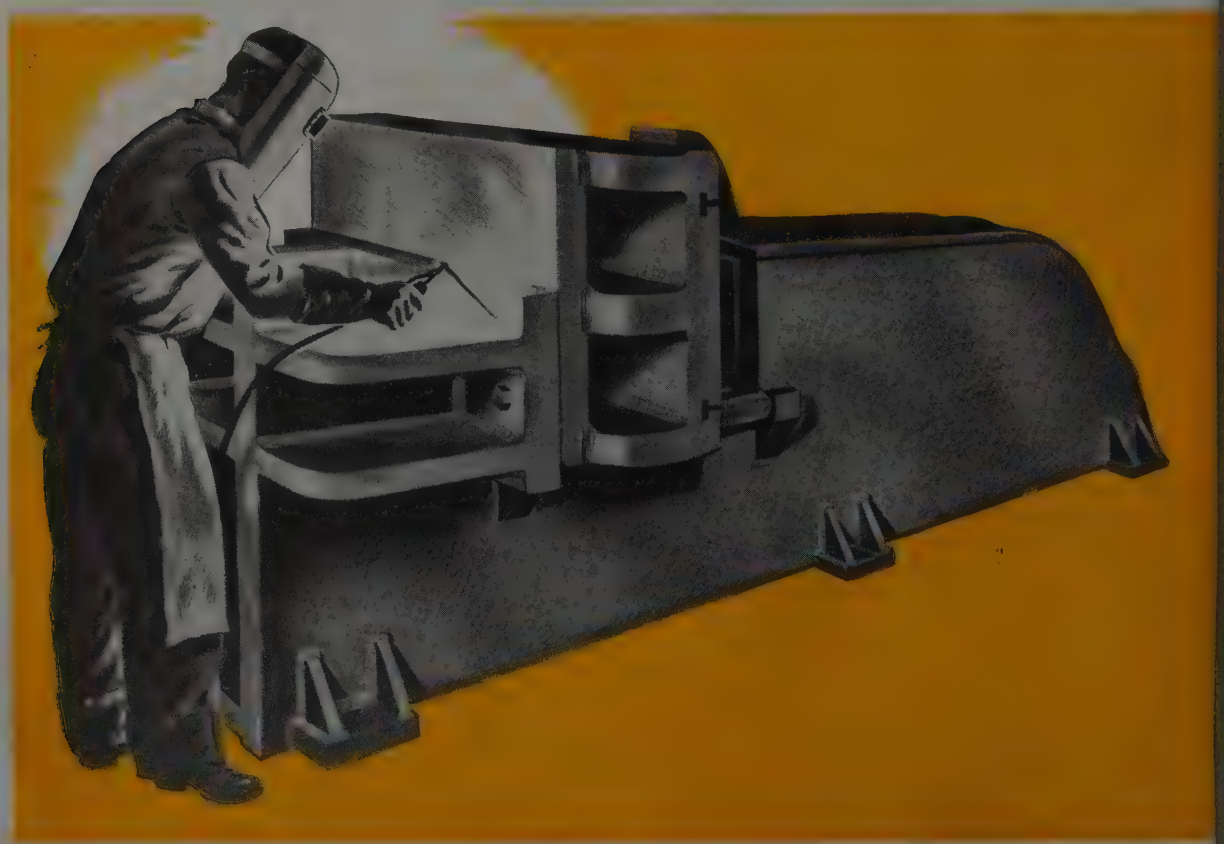
IF you want high speed deposition *and* quality welds, try this new DH-2. It's a redeveloped P&H electrode, now so fast that in competitive tests it deposited *1½ pounds more metal per hour* than any other electrode in its class.

New users are turning to DH-2 every day because of its outperforming ability — because it provides faster, sounder production at substantially lower cost. And with DH-2 you also benefit with better appearing products because of the unique way weld metal "feathers out" smoother, neater.

Further, DH-2 gives you welds that are machinable as deposited or heat treated It gives you more exacting control over depth of penetration. And DH-2 is easy to handle — has minimum spatter loss.

DH-2 is a *production* electrode that must be tried to be believed. So make your own tests. Compare it for speed and quality and convince yourself!

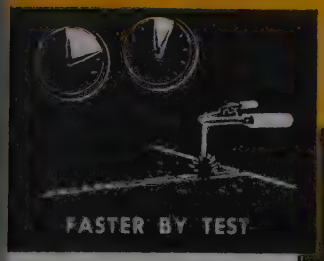
CALL YOUR P&H REPRESENTATIVE OR WRITE FOR DETAILS.



COMPARE FOR SPEED
COMPARE FOR RESULTS

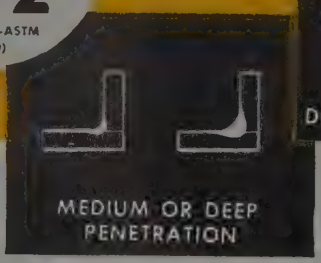
P&H DH-2

(Class AWS-ASTM E6020)



Tests prove DH-2 20% faster! Get more metal deposition per hour, cut welding time and costs, with this improved P&H Electrode.

Improved weld appearance because weld metal literally "feathers out" neat and uniform. No notched effect along weld edges.



DH-2 provides depth control. Welds at normal amperages for medium penetration — high amperages for deep penetration.

Improved DH-2 performs extremely well for all horizontal, flat fillet and groove welding. It meets and beats today's requirements for all positioned welding.

OTHER P&H ELECTRODES MEET *ALL* REQUIREMENTS

Whatever your electrode needs, P&H can supply the correct sizes and types. Here are a few of P&H mild steel electrodes. Others for alloy and stainless applications —for cast iron and for building up and hard surfacing.

P&H

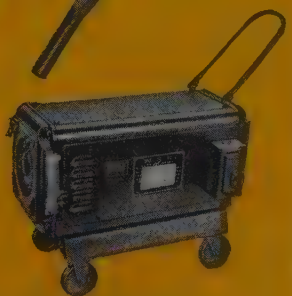
WELDING ELECTRODES

4411 West National Avenue
Milwaukee 14, Wisconsin

HARNISCHFEGER CORPORATION

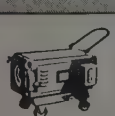
WELDING ELECTRODES · MOTORS · HOISTS · P&H · ELECTRIC CRANES · ARC WELDERS · EXCAVATORS

P&H OFFERS AMERICA'S MOST COMPLETE WELDING SERVICE

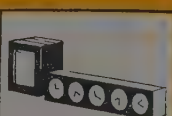


WELDING POSITIONERS

ELECTRIC HOISTS


DC WELDERS

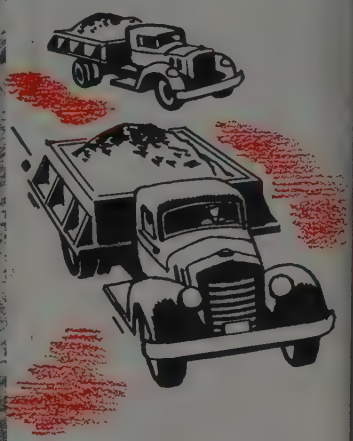
AC WELDERS


WELDING PRODUCTION CONTROL SYSTEMS

P&H ARC WELDERS

Made by one of the world's largest builders and users of arc welding equipment, P&H welders offer many added values in construction and operation. Model WA-200 shown has welding service range from 30 to 285 amperes, other AC and DC models to 1250 amperes.

Alloy Steels



Increase Strength

MORE THAN ANY OTHER MATERIAL

Alloy steels are the strongest of metals. Their exceptionally high strength-to-weight ratio assures the most efficient combination of these two properties. Thus, alloy steels can impart the greater strength needed in gears, pinions, shafts and other reciprocating parts of huge power shovels as shown above, as well as vital operating parts of trucks, tractors and all types of machines. And alloy steels can do it better than any other material—without adding size or weight.

But there are other good reasons for your use of alloy steels. They can be hardened uniformly and accurately to the widest extremes of any material—thus resist wear. They are tough—resist shock, impact, sudden reversal of stresses, vibration. They resist the insidious attack of fatigue. And in stainless grades, they resist corrosion and oxidation at high temperatures.

Alloy steels give you more for your money where service is severe. And Republic metallurgists are ready to help you select the proper analysis for each application. Write us.

REPUBLIC STEEL CORPORATION

Alloy Steel Division • Massillon, Ohio

GENERAL OFFICES • • CLEVELAND 1, OHIO

Export Department: Chrysler Building, New York 17, N. Y.

MID AMERICA EXPOSITION CLEVELAND

Republic

REPUBLIC STEEL

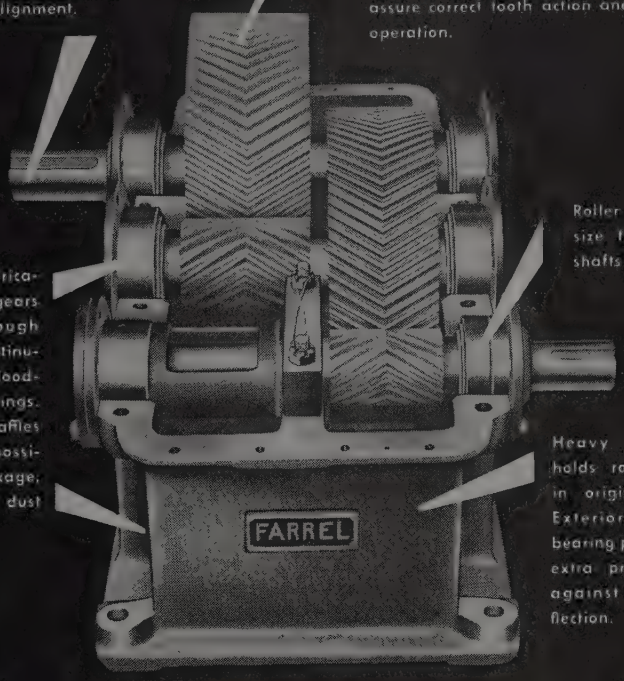
ALLOY STEELS

Other Republic Products include Carbon and Stainless Steels—Sheets, Strip, Plates, Pipe, Bars, Wire, Pig Iron, Bolts and Nuts, Tubing

WHERE FARREL PROTECTS THIS SPEED REDUCER'S FUTURE

Precision ground shafts are designed to provide the rigidity necessary to prevent deflection and keep gears in exact alignment.

Herringbone gears—the famous Gear with a Backbone design—provide extra strength and load carrying capacity because the teeth are continuous across the face. Accurate generation of tooth contour and spacing, gradual engagement and oblique lines of contact assure correct tooth action and smooth, quiet operation.



Roller bearings of adequate size for the job hold the shafts in precise alignment.

Continuous splash lubrication supplies oil to gears and bearings. A trough system channels a continuous flow of oil to flood-lubricate the bearings. End covers and baffles at shafts prevent possibility of oil leakage, or entrance of dust and dirt.

Heavy section housing holds rotating elements in original alignment. Exterior ribbing at bearing points gives extra protection against deflection.

To assure a longer future of smooth, efficient power transmission for this speed reducer, Farrel has designed in special protection at five vital places.

This five-point protection gives Farrel speed reducers additional vitality to withstand tough wear and preserves original power-transmitting ability for many extra years of trouble-free operation.

Farrel speed reducers are available in a wide range of sizes, with standard ratios of single reduction units from 1½:1 to 10:1, and double reduction units from 10:1 to 60:1. For further information, write for descriptive bulletins.

FB-370

FARREL-BIRMINGHAM COMPANY, INC.
344 VULCAN STREET, BUFFALO 7, N. Y.

Plants: Ansonia, Derby and Stonington, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, Stonington, New York, Pittsburgh, Akron, Chicago, Los Angeles, Tulsa, Houston, Charlotte.

FARREL
The Gear with the Backbone

Farrel-Birmingham

HEAT AND CORROSION RESISTING CASTINGS

Midvale manufactures two groups that find multiple uses in many important industries. For instance—the great chemical and steel industries, the automotive industry and oil refineries with all their feeders, depend upon such characteristics in hundreds of parts and items. To name a few—tubes, pump parts, supports, hangers, beams, boxes, pots, covers, trays, liners, grids, pans, retorts, baskets, fixtures, holders and spacers for carburizing, annealing, normalizing and malleabilizing purposes. Design proved by non-destructive inspection, with Midvale's penetrating 2,000,000 volt X-ray tube.

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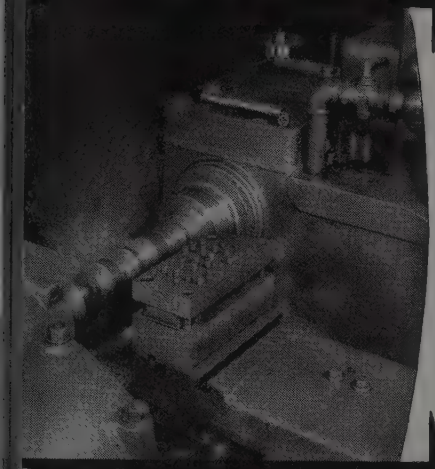
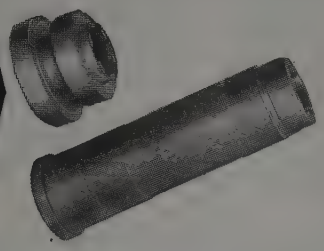
STAINLESS AND TOOL STEEL BARS
•
CORROSION AND HEAT RESISTING CASTINGS
•
FORGINGS AND RINGS

MIDVALE
Custom Steel Makers to Industry

FOR BETTER PRODUCTION AND LOWER TURNING COSTS . . . USE

1 • Short Run Turning

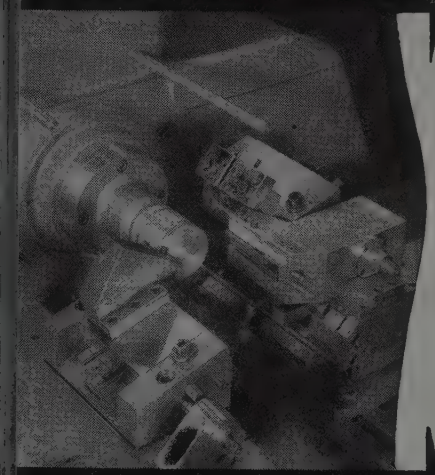


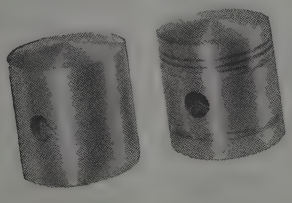


The two parts shown above are dissimilar and require different tooling setups, yet they are only 2 of the 100 or more parts this manufacturer turns on Standard Sundstrand automatic lathes.

Lot sizes range from 25 to 100 pieces and setup time averages less than 45 minutes. Time savings range up to 43 hours out of 50 hours per lot over former method of machining. Universal and easily adjusted tooling handles most all jobs.

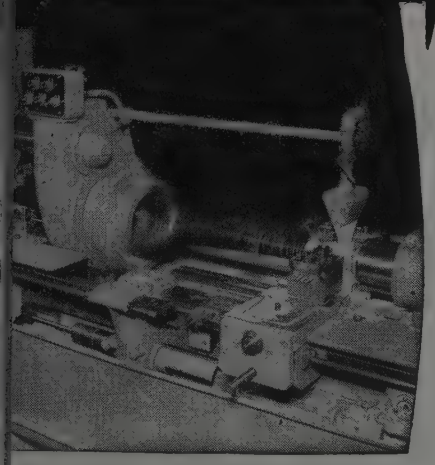
2 • Long Run Turning

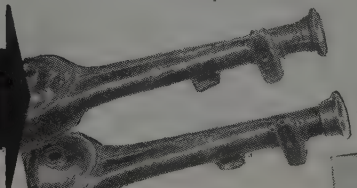




Here's a Standard Sundstrand lathe turning pistons at the rate of approximately 150 per hour. It's tooled to semi-finish and finish turn O. D., finish turn the dome, rough and finish turn ring grooves, chamfer all ring lands and chamfer skirt and dome end. The automatic cycle on this mass production job, makes it easy for an unskilled operator to achieve this production consistently. Multiple tooling, plus automatic cycling also makes it possible to duplicate these parts to close limits consistently.

3 • Special Turning





This special Sundstrand long bed lathe is tooled to machine both ends simultaneously. In this way, a maximum of machining is done with only one handling of the large rear axle housing. The part is rotated by a center drive while two longitudinal feeding front carriages and two rear cross feeding tool slides machine the ends. After the part is loaded, cycle is automatic, and production reaches approximately 32 pieces per hour.

Multiple Tooling plus Automatic Cycling

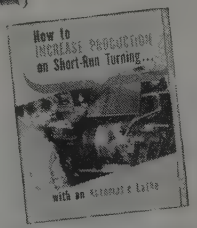
ON A

Sundstrand

AUTOMATIC LATHE

Whether your turning problem is a mass production job running into thousands of pieces . . . a short run of as few as 25 pieces . . . or a special turning job, Sundstrand engineers will show you how it can be handled to advantage on automatic lathes with quick cycle changeover. They will also assist in designing the most profitable processing method for the job at hand.

All of the advantages of multiple tool turning are available for both short run and mass production work with Sundstrand lathes. When the nature of the work is such that these standard automatic lathes cannot be tooled to handle the part, our engineers recommend and design special automatic lathes. Described here are three typical cases in which Sundstrand "Engineered" production assisted plant engineers in designing a tooling method which resulted in lower turning costs.



MORE FACTS FREE

This 44 page booklet will show you many possibilities for applying multiple tooling to your turning jobs. Write for bulletin 759.

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SUNDSTRAND MACHINE TOOL COMPANY

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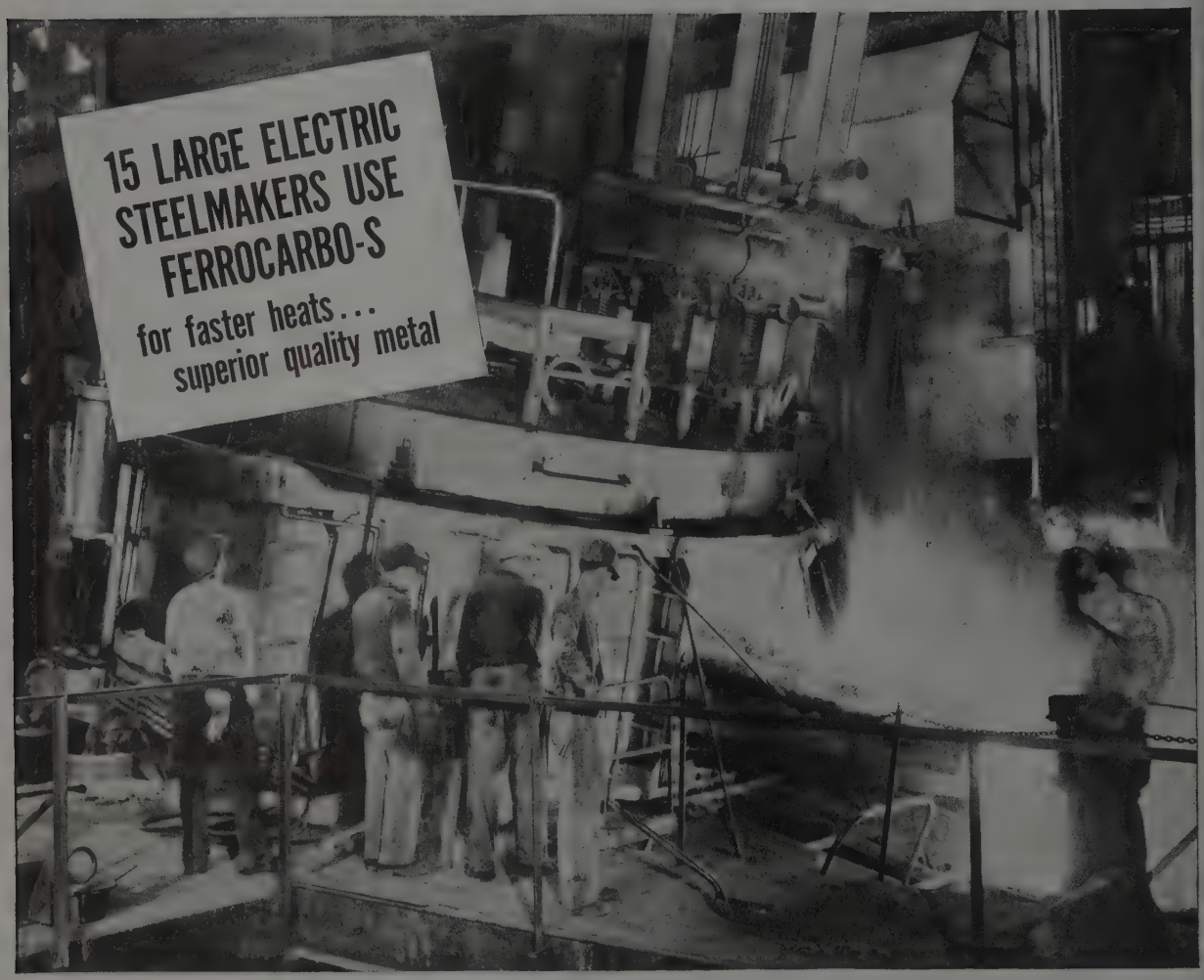
SPEED UP PRODUCTION of basic Electric Steel AT NO EXTRA COST!



"KT" LECTROMELT furnace courtesy Pittsburgh Lectromelt Furnace Corp.

Savings from 15 to 45 minutes furnace time during the finishing period of each heat is directly attributed to FERROCARBO-S. Such is the enthusiastic report of 15 large basic electric furnace steel producers.

Acting in the slag in atomic form, the elements from FERROCARBO-S provide more rapid and efficient deoxidation. This is assured by the instability of this specially processed deoxidizing agent.

Ask our metallurgists to describe the effective use of FERROCARBO-S in your particular practice. Write for details.

FERROCARBO-S
BY CARBORUNDUM
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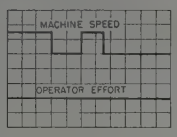
"Carborundum" and "Ferrocarbo" are registered trademarks which indicate manufacture by The Carborundum Company

HALT RISING PRODUCTION COSTS with these *electronic* controls

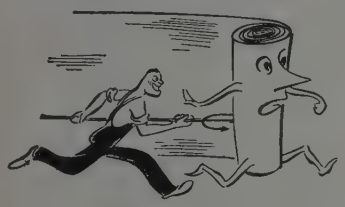
CHANGE MACHINE SPEEDS INSTANTLY, EASILY—WITH THY-MO-TROL* DRIVE



It's as easy and quick as adjusting the volume control on your radio. And once the machine is set for correct speed it stays there, even while going from no load to full load, because the electronic circuits compensate for fluctuating loads. Result: maintained production and improved quality of output despite load changes. Thy-mo-trol drive includes electronic panel, d-c motor, transformer, and small control station. Operates on a-c power. Standard sizes from 1/8 to 25 hp. Many uses, such as driving drill presses, grinders, lathes, conveyors.

**G.E.'s trademark for motor control using electronic tubes.*

Make Moving Webs Run True

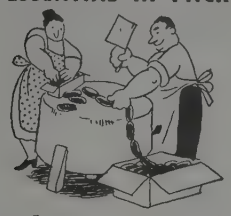


When a moving web must be guided through a manufacturing process, it is usually important to keep the lateral position of the strip in a given relation to the processing machine. If lateral position is not maintained, waste mounts, production decreases and costs soar. G-E side-register control automatically keeps the web in correct lateral position. This device is ideally suited for application on slitting, rewinding and side-trimming machines. Bulletin GEA-4410.

Let the "Eye" Do Your Counting and Sorting

Some of the most tedious jobs in your factory which have required constant attention from workers can easily be taken over by photoelectric relays. Because only a beam of light touches the object being counted or sorted, fragile parts or freshly painted pieces are not harmed. Equipment consists of a light source and an electronic relay, which can very easily be mounted over a conveyor. These relays are also useful for many inspection jobs which may be tying up essential workers. Bulletin GEA-1755.

PROPER CUT-OFF IS ESSENTIAL IN PACKAGING

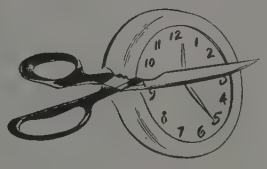


Poor cut-off register on imprinted wrappers and packages can spoil the appearance of your product and destroy its sales appeal. Constant vigilance by the packaging-machine operator can reduce, but never *prevent*, misregister. Electronic register control prevents misregister, and no rejects occur. G-E cut-off register control instantaneously compensates for draw-roll slippage, web stretch and shrinkage, and web speed variations in relation to the cutter. Check Bulletin GEA-4371 for full details.

To time processes rapidly, accurately, automatically

●You'll find many tasks that these small, sturdy, dependable electronic timers can take over and thus release employees from tedious jobs. Five forms cover easily adjusted timing ranges from 0.045 second to 2 minutes. Hundreds are in use on mixing machines, grinders, conveyors, sign flashers, riveters. Several timers can be combined to cover a sequence of operations. Electronic timers are easy to install and economical to operate. Only one moving part—means long life and low service cost. Bulletin GEA-2902.

Cut assembly time on small parts

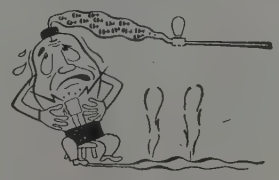


Thyratron control for low-capacity, bench-or-tong, spot welders will speed small-parts fabrication such as welding solid or stranded conductors to terminals, or welding electronic tube elements. These alert, accurate controls have recorded a two-to-one advantage over soldering and riveting. Rejects drop to a new low because of the accuracy and split-cycle response of these controls. They are designed for either 230- or 460-volt, 60-cycle operation, and are rated 77 amperes peak on a duty cycle not exceeding 10 per cent. 50-cycle equipment is also available. Check Bulletin GEA-4175A.

IT'S easier to "keep everything under control" when you turn over many of the routine, mechanical jobs to reliable, economical, electronic control equipment. New operators can be trained more quickly, experienced workmen can be released for supervisory or other more important jobs. Often the addition of electronic control makes equipment more productive and helps prevent waste of materials. Production is not only simplified, but it is speeded as well, and costs are reduced.

Our engineers have a wide experience in designing and adapting electronic equipment. They may be able to make valuable suggestions on how electronic control can improve your operations. All you need do is call our nearest office, and we'll work with you from then on.

INDUSTRIAL ELECTRONICS MADE EASY . . . VISUALLY



What goes on inside a vacuum tube? How does it function in a circuit? How can its life be prolonged? These and many other questions about industrial electronics are answered simply and interestingly in a new sound slidefilm training course, part of General Electric's MORE POWER TO AMERICA program. The course is designed to teach even non-technical personnel the elements of electronics. It comes complete with 12 slidefilms and records, 300 review books, instructor's manual and carrying case. Your employees can learn faster and remember what they learn longer with this easy-to-understand talking slidefilm. Bulletin GES-3303A.

General Electric Company, Section C685-25
Schenectady 5, New York

Please send me the bulletin(s) checked below:

- ☐ GEA-4410 (Side-register control)
- ☐ GEA-4371 (Cut-off register control)
- ☐ GEA-1755 (Photoelectric relays)
- ☐ GEA-4175A (Thyratron welding controls)
- ☐ GEA-2902 (Electronic timers)
- ☐ GES-3303A (Industrial electronics training course)

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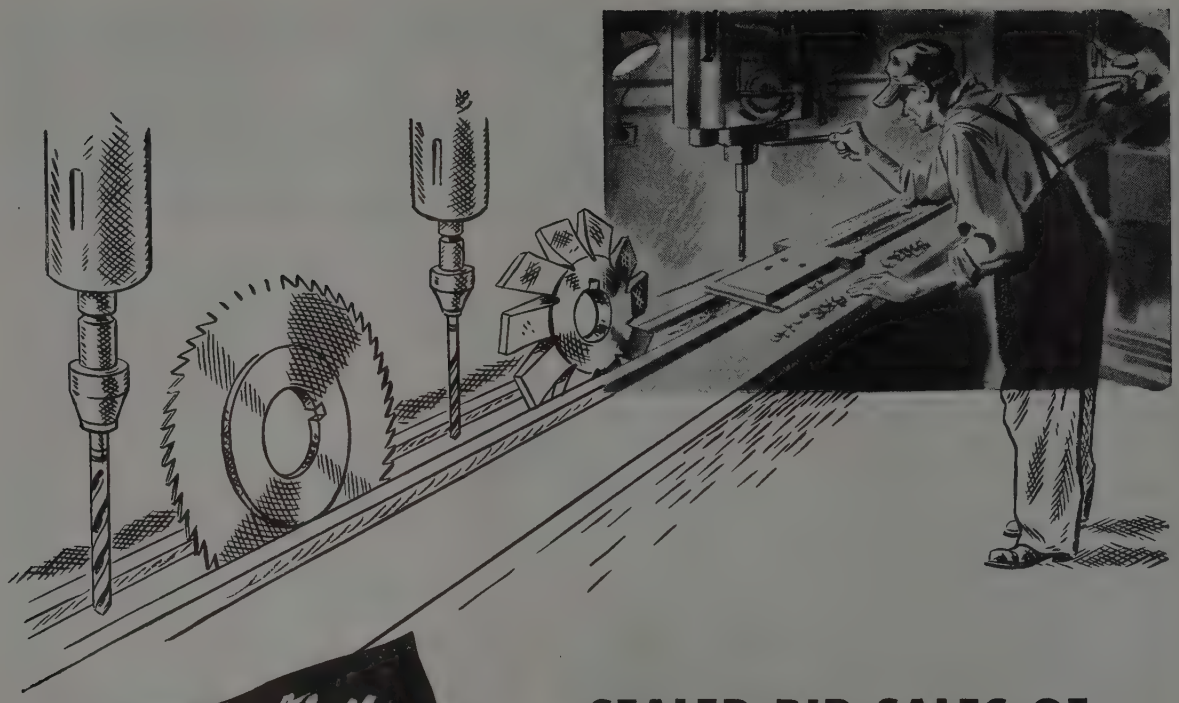
GENERAL ELECTRIC



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Cutting Tools

$54,000,000 worth of cutting tools are available now to you in the metal working industries who act quickly. Thousands of types to choose from, prompt delivery, and bargain prices to those who inquire, inspect and invest. The inventory includes: cutting tools for machine tools, metal turning tools for metal turning machines, accessories and attachments for machine tools, and tool room specialties in all sizes and types.

★ ★ ★

Sales of cutting tools will be held at frequent intervals. The entire inventory will be sold on a sealed bid basis and while every regional office has a stock of cutting tools, the largest inventories are located in these cities.

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Contact your nearest WAA Regional Office or any of the regional offices listed below requesting that your name be placed on their mailing lists for all future offerings. Arrangements will gladly be made for inspection prior to submitting bids.

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WAR ASSETS ADMINISTRATION

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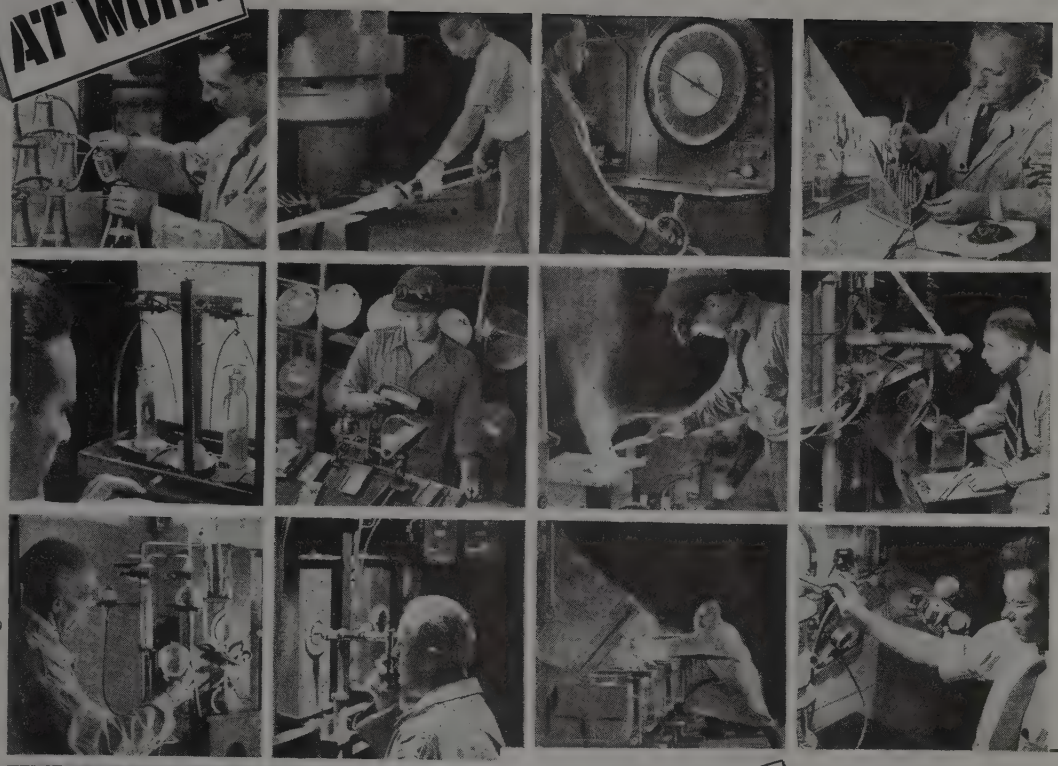
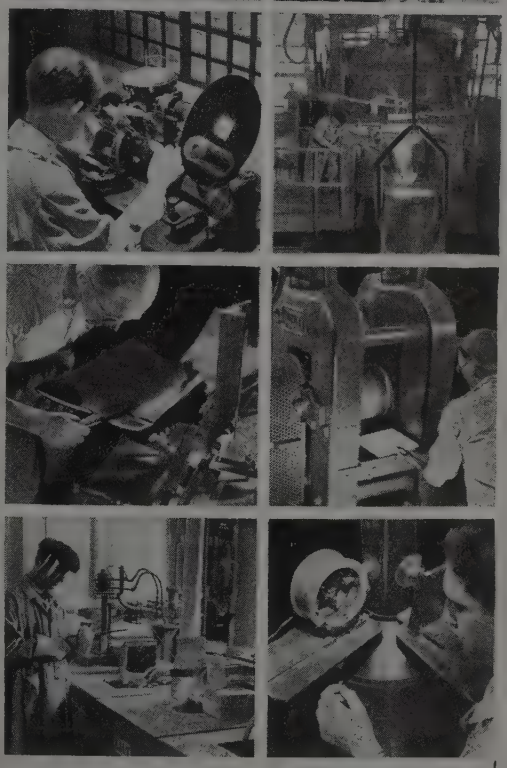
1082

MEN AT WORK





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Better alloys—better steels . . . these are what Electromet's research brings to you . . . And here you see this research at work in our laboratories at Niagara Falls, New York, where more than a hundred scientists and engineers assisted by many laboratory technicians are devoting their efforts toward helping to solve your metallurgical problems. Out of their technical knowledge . . . their years of training and experience . . . and their creative minds will come many of the alloy developments of tomorrow.

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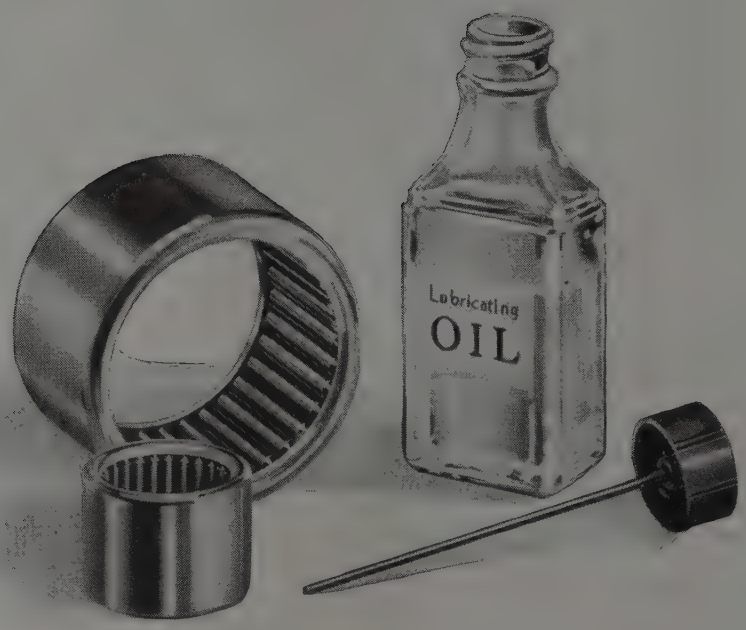

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in anti-friction bearings, proper attention to lubrication is essential. With Torrington Needle Bearings efficient lubrication is almost automatically assured.

A drop or two as required...

may be the "prescription" for your application and often no additional lubricant is needed after the initial installation. For in Torrington *Needle* Bearings the lubricant *lasts* for a long period. Because the turned-in lips of the retaining shell provide a natural reservoir for oil or grease, an *extra margin* of safety is provided. This is another Needle Bearing feature that is contributing to their record of long service life and low in-use cost.

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CALL OR WRITE your local Crucible branch office and warehouse. Ask for the literature you need. It's free, and so are the personal services of Crucible's metallurgists and engineers who will help you choose, use, work, and heat treat specialty steels.

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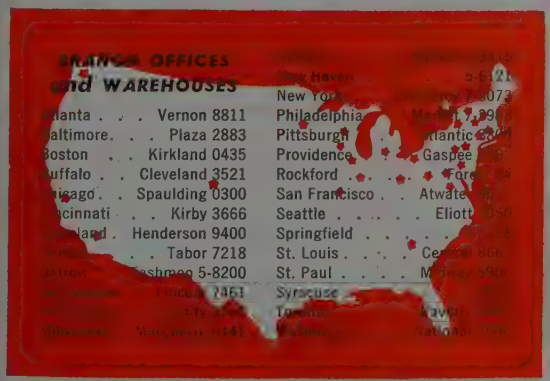
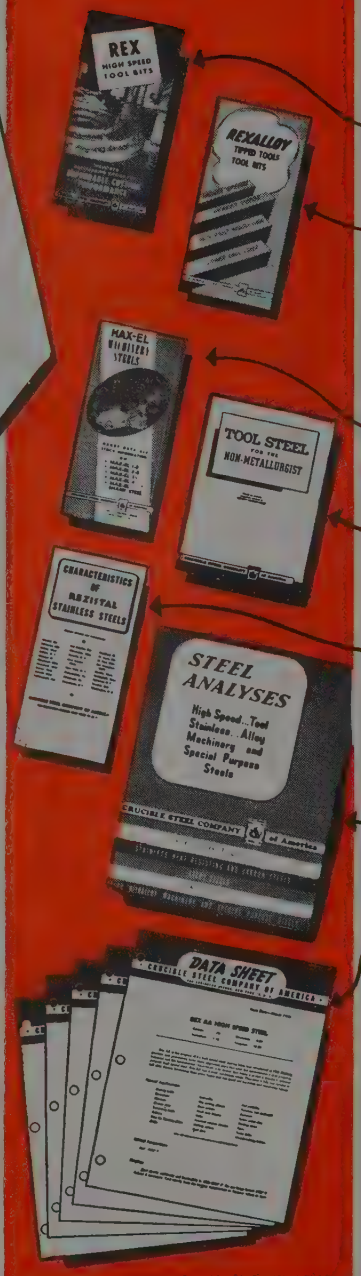
Here you can get all the steels you need . . . and get them fast. Make Crucible's stockroom *your* stockroom . . . cut down your inventories . . . simplify and centralize your buying. Get the habit of calling Crucible for specialty steels plus engineering service.





1 Rex High Speed Tool Bits
Folder giving characteristics and applications of Crucible's Rex high speed tool bits.

2 Rexalloy Cast Non-Ferrous Cutting Alloy
A folder on Crucible's Rexalloy tipped tools and tool bits for applications between high speed steels and tungsten carbides. Speeds and feeds on various materials; bit sizes; economies; increased efficiencies.

3 Max-el Machinery Steels
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4 Tool Steel for the Non-Metallurgist
A 32-page book on tool steels, their application and heat treatment.

5 Characteristics of Rezistal Stainless Steels
Grades, analyses, type numbers, properties, heat treatment, forging, cold working, drawing, machining, and welding Crucible's Rezistal Stainless Steels.

6 Steel Analyses
Handy wall chart, listing analyses of high speed, tool, stainless, alloy, machinery, and special purpose steels.

7 Data Sheets on Various Steels
Individual data sheets on leading Crucible Steels of the following types: High Speed; Hot Work; Die Casting Dies; Air, Oil and Water-Hardening Tool Steels; Plastic Molding; Alloy; and Machinery. Analyses, applications, critical temperature, forging, annealing, hardening, tempering, hardness and TTT curves where pertinent. Send for data sheets on all steels you use.

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You Can SEE That

It's ONLY the SIDE of a V-Belt

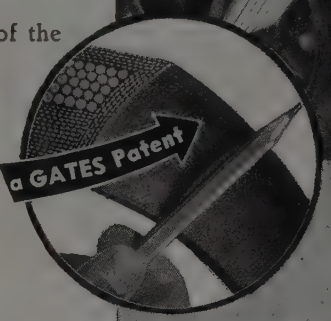
That Grips the Pulley and Gets the Wear!

DIAGRAM OF BELT IN PULLEY GROOVE

Look at a V-Belt in its sheave and you see at once that the *sides* of the belt do all the gripping on the pulley and get all the wear against the sheave-groove wall.

Notice, too—it's the *sides* that pick up all the power delivered by the driver pulley. The sides *transmit* that power to the *belt as a whole*. And then, once more, it's the sides—and the sides *alone*—that grip the driven pulley and *deliver* the power to it.

That is why you have always noticed that the sidewall of the ordinary V-Belt is the part that wears out first.



—and Here Is How the CONCAVE SIDE ★REDUCES Sidewall WEAR and Lengthens Belt Life!

Clearly, since the sidewall is the part that wears out first, anything that prolongs the life of the sidewall will lengthen the life of the belt.

The simple diagrams on the right show exactly why the ordinary, straight-sided V-Belt gets excessive wear along the *middle* of the sides. They show also why the Patented Concave Side greatly reduces sidewall wear in Gates Vulco Ropes. That is the simple reason why your Gates Vulco Ropes are giving you so much longer service than any straight-sided V-Belts can possibly give.

Straight Sided V-Belt

How Straight Sided V-Belt Bulges When Bending Around Its Pulley

You can actually feel the bulging of a straight-sided V-Belt by holding the sides between your finger and thumb and then bending the belt. Naturally, this bulging produces excessive wear along the middle of the sidewall as indicated by arrows.

Gates V-Belt with Patented Concave Sidewall

Showing How Concave Side of Gates V-Belt Straightens to Make Perfect Fit in Sheave Groove When Belt Is Bending Over Pulley

No Bulging against the sides of the sheave groove means that sidewall wear is evenly distributed over the full width of the sidewall—and that means much longer life for the belt!

★More Important NOW That STRONGER Tension Members are Used

Now that Gates *Specialized* Research has resulted in V-Belts having much stronger tension members—tension members of Rayon Cords and Flexible Steel Cables, among others—the sidewall of the belt is often called upon to transmit to the pulley much heavier loads. Naturally, with heavier loading on the sidewall the life-prolonging Concave Side is more important today than ever before!

THE GATES RUBBER COMPANY Denver, U. S. A.

"World's Largest Maker of V-Belts"

473

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Engineering Offices and Jobber Stocks IN ALL INDUSTRIAL CENTERS of the U. S. and 71 Foreign Countries

Gates

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THE MARK OF SPECIALIZED RESEARCH

Everything
YOU NEED
in BEARING
BRONZE

from
STOCK

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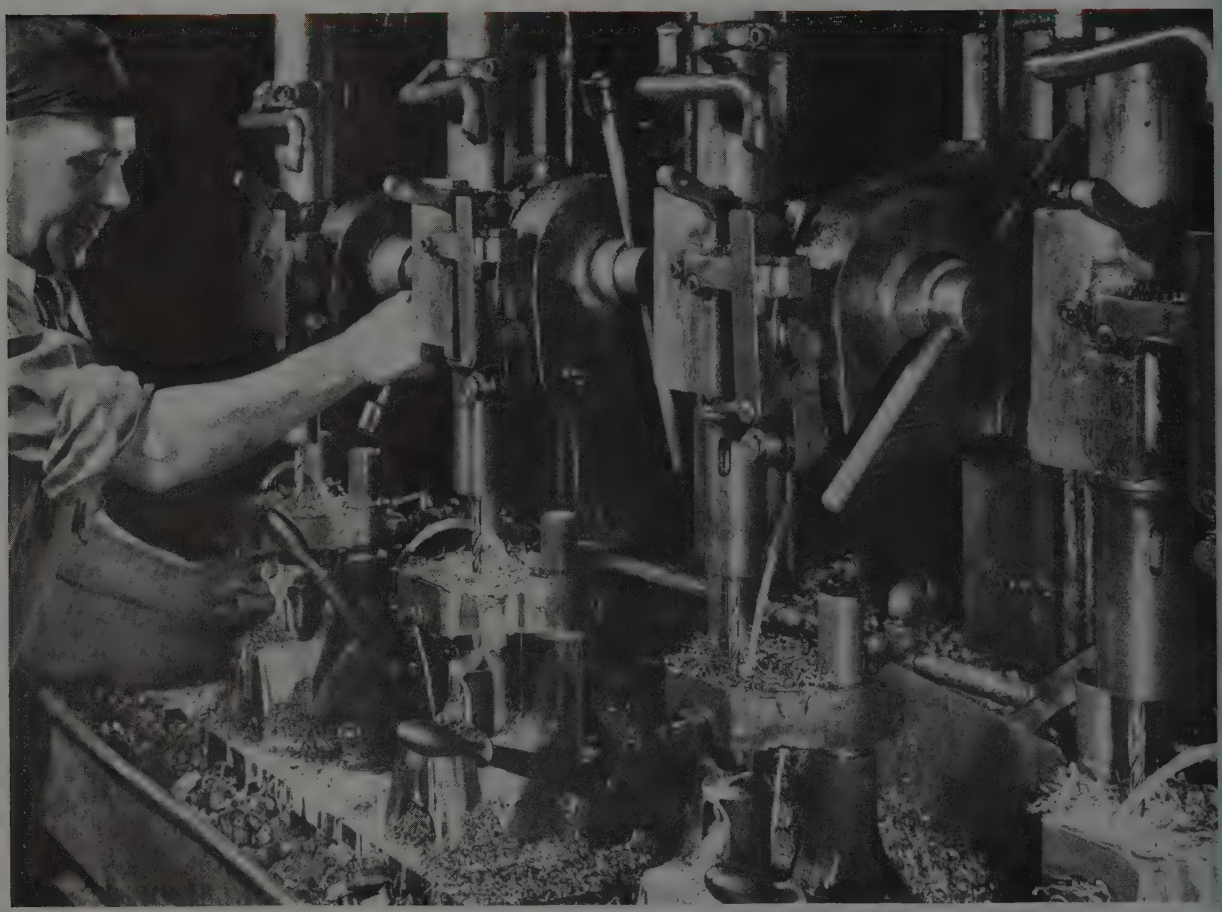

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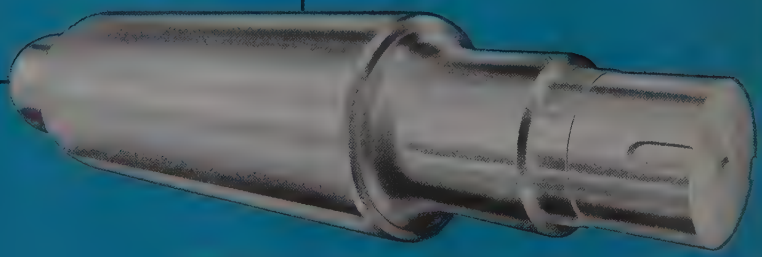

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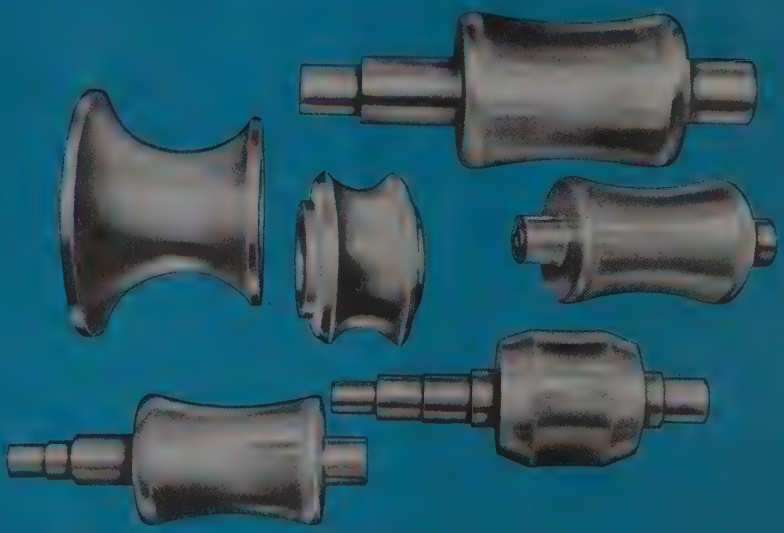

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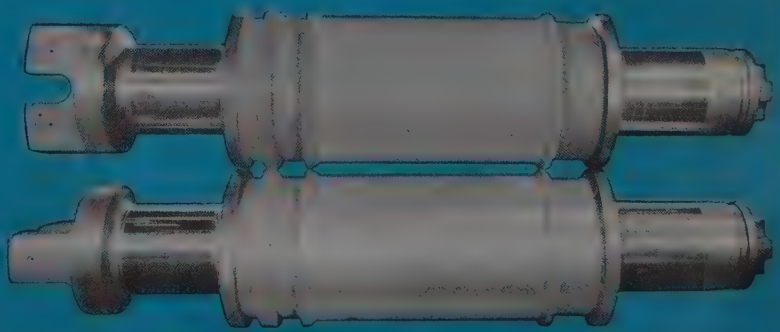

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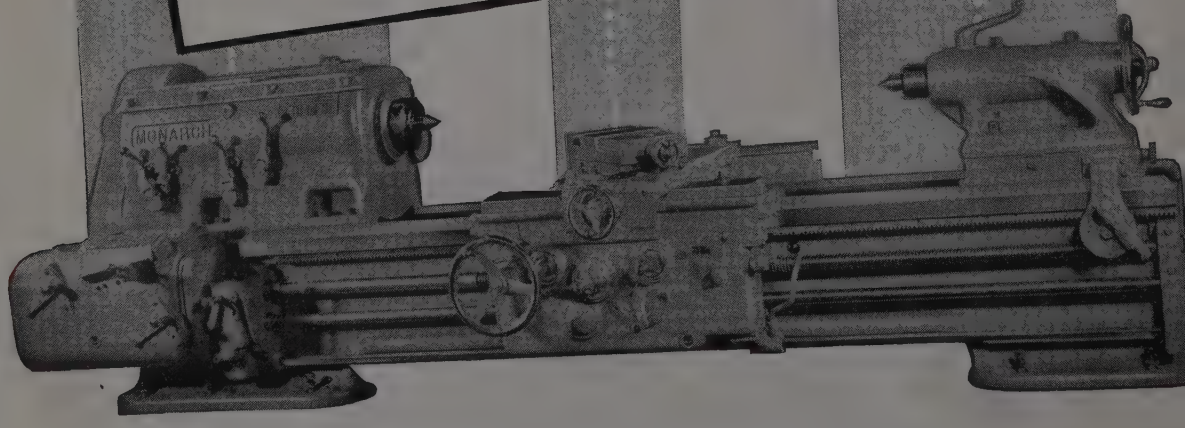

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Business Staff on Page 4

EXT WEEK . . .

Vacuum Melting and Casting
Electric Arc Furnace Operation
Fundamentals of Steel Carburization
Streamlining Industrial Methods
Relocation of Equipment Pays Dividends

STEEL

The Magazine of Metalworking and Metalproducing

VOL. 120, NO. 14 APRIL 7, 1947

NEWS

★ As the Editor Views the News 57
Materials Industry's No. 1 Worry 61
"Little Nathan Report" Plugs for 21-cent Increase for Steelworkers 63
★ Present, Past and Pending 63
Steel Price Action Hinges on Wages 64
Industry's Pace Off on West Coast 66
Cautious Attitude Prevails in Industry Circles in Southern California District 66
Production of Paint Held Down by Metal Container Shortage 67
WAA Transfers Hand Tools for Vets' Use to VA 68
Pressed Metal Group Discusses Labor Relations 69
★ Windows of Washington 70
France To Admit Italian Workers Under New Pact 74
British Iron, Steel Production Set Back by Power Curtailment 75
★ Mirrors of Motordom 77
Lone Star Steel Takes Five-year Lease on Plant 80
★ Briefs 81
★ The Business Trend 82
★ Men of Industry 84
★ Obituaries 89
★ Construction and Enterprise 184

TECHNICAL

How Silver Brazing May Simplify Casting Design 90
Surface and Overhead Conveyor Speeds Stoves to Market 92
Recent Developments in Rare Metals 93
Supersonic Waves Locate Die Block Flaws 95
Preweld Cleaning 96
Need Grows for Smelting Fine Iron Ores 97
Texas Tool Engineering Methods Show Active, Independent Thinking 98
Safety Program with a Forceful Follow Up 100
★ Progress in Steelmaking—Plugging Relays Minimize Motor Reversing Time 106
★ Engineering News at a Glance 112
Radar Equipment To Benefit Lake Vessel Operation 115
★ New Products and Equipment 157

MARKETS

Steel Price Action Deferred Pending Wage Settlement 163
★ Market Prices and Composites 164
Nonferrous Metal Price Tone Firms 168

★ *Index to Advertisers* 194

★—Denotes regular features.

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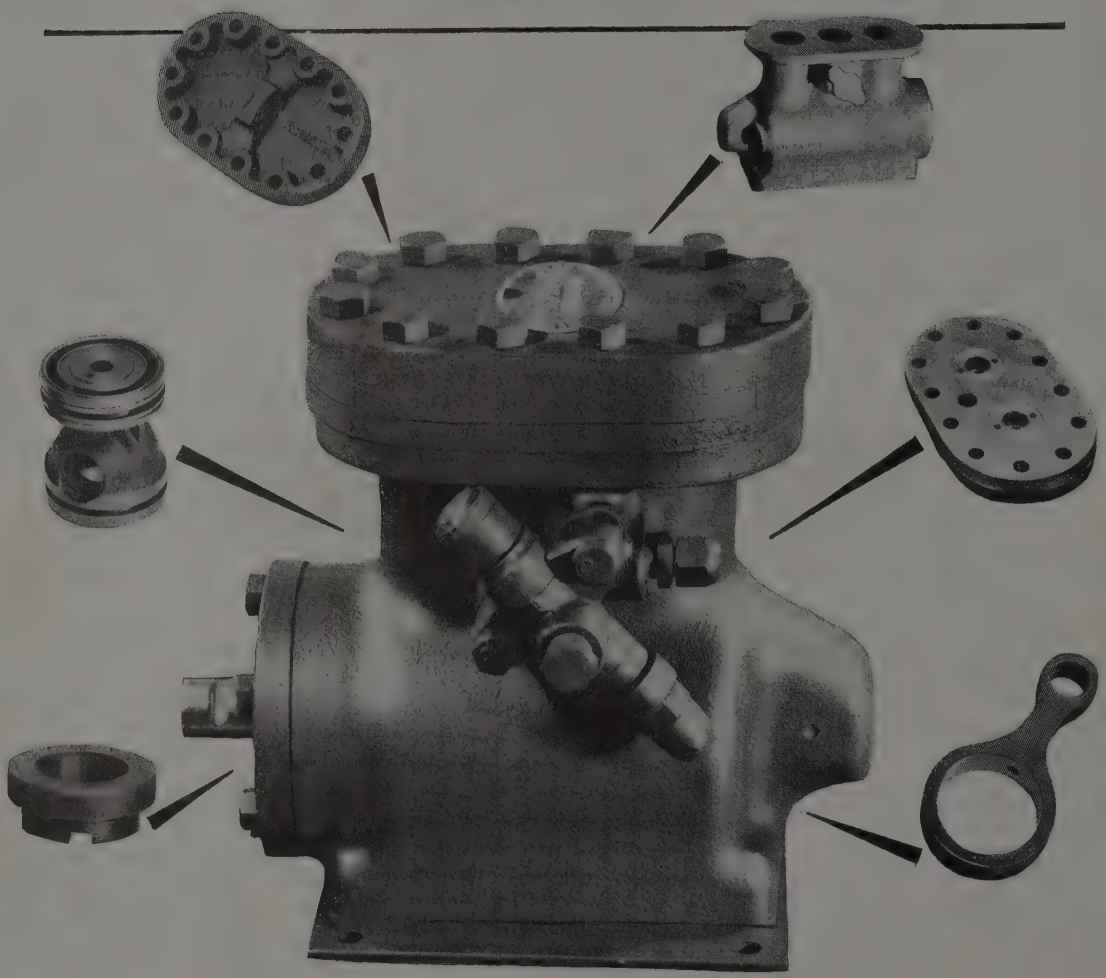

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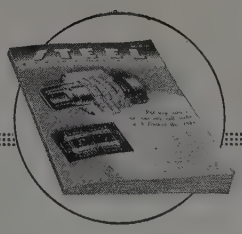


April 7, 1947

The Great Discovery!

Seldom in American history has one witnessed as curious a transformation in public attitude as that which is evidenced by the present zeal to purge the nation of communists. If it were not for the sinister implications of the Red problem, the sudden about-face could be ludicrous.

When the New Deal assumed power in 1933, persons who by any stretch of the imagination could be classified as "liberals" became preferred personages in the eyes of Washington officialdom. A pronounced "pink" was far more welcome in the White House than was an individual so unfortunate as to be an industrialist or as to have met a payroll. At times it seemed as if the screwier one was and the more picturesque his language in disparaging American traditions, the higher he ranked in exalted councils. Communists and fellow travelers flourished in this environment.

Meanwhile, industrial employers were waging a losing battle against Red sabotage. They suffered from sit-down strikes, slow-downs and other work interruptions, many of which were clearly traceable to communists. When they tried to discharge the trouble makers they were blocked by numerous laws, directives and administrative interpretations. Employers knew that Reds were operating under the immunities which Washington vouchsafed to labor, but when they ventured to point this out to responsible government officials, the latter pooh-poohed the warnings. "Labor is too young to be responsible," they said. "Give labor leaders time to develop discipline and everything will be all right."

Coddled in this fashion by the federal government, communists grew stronger in numbers and in influence until the split developed which finally led to the firing of Henry Wallace by President Truman. Since that time the pendulum of public opinion regarding communists has been swinging sharply to the right. Today it is gaining such momentum that there is danger that some extremists may go too far.

For instance, the proposal that the Communist party be outlawed should be considered carefully before a decision is made. Likewise, proposed tests of loyalty should be scrutinized closely to make sure they do not abridge constitutional rights of individuals.

We should be elated that at long last persons in high places have made the great discovery that the Red menace is real. At the same time, we should be on our guard lest those who a decade ago were suckers for the Reds now in the hysteria of belated denouncement indulge in tactics so drastic that they will backfire.

* * *

SUPPLIES AND PRICES: With the first quarter in the background, industrialists are seeking clues as to what may be expected during the remainder of the year.

At the moment the outlook, while blurred in many respects, really is clearer than it was at the beginning of the year. For one thing, the threat of widespread labor trouble is not as serious as at that time. Also, continued operations at high levels throughout the first three months of the year have taken the edge off of all but a few of the acute material and products shortages. Industrial efficiency on the whole has improved appreciably and profits have been satisfactory for most companies.

Therefore, if one can assume that the wage negotiations pending in the steel and automobile industries can be brought to a satisfactory conclusion without major work stoppages, the second quarter should see a continuance of industrial activity at high levels. If this proves to be true, then industrialists will shift their main attention from labor relations to the procurement of supplies and to prices.

These factors will be important in the second

(OVER)

quarter. Operations at a high rate will require record-breaking materials and supplies and at the same time will advance the advent of a buyer's market. Simultaneously, price trends during the quarter will have a strong influence upon the dimensions of that market. —pp. 61, 64, 163

* * *

PERTINENT QUESTIONS: Petulant action of John L. Lewis in proclaiming a stoppage of coal mine operations for a week as a "memorial" to the 111 miners who lost their lives in the Centralia disaster raises a number of embarrassing questions.

First, and perhaps least important, is why the federal government ever agreed to a clause in its contract with the United Mine Workers providing that UMW "may designate memorial periods." With a loophole as broad as this, one wonders why Mr. Lewis did not designate a "memorial" period of a full month.

Secondly, why are mine inspections and safety compliance so loosely handled? Millions of persons who criticize Lewis on every other count are with him on the score of greater safety in mine operations.

Thirdly, and most important, what tangible progress has Congress made thus far in legislating protection for union members and for the public against the abuse of power by union tyrants of the Lewis type? —p. 61

* * *

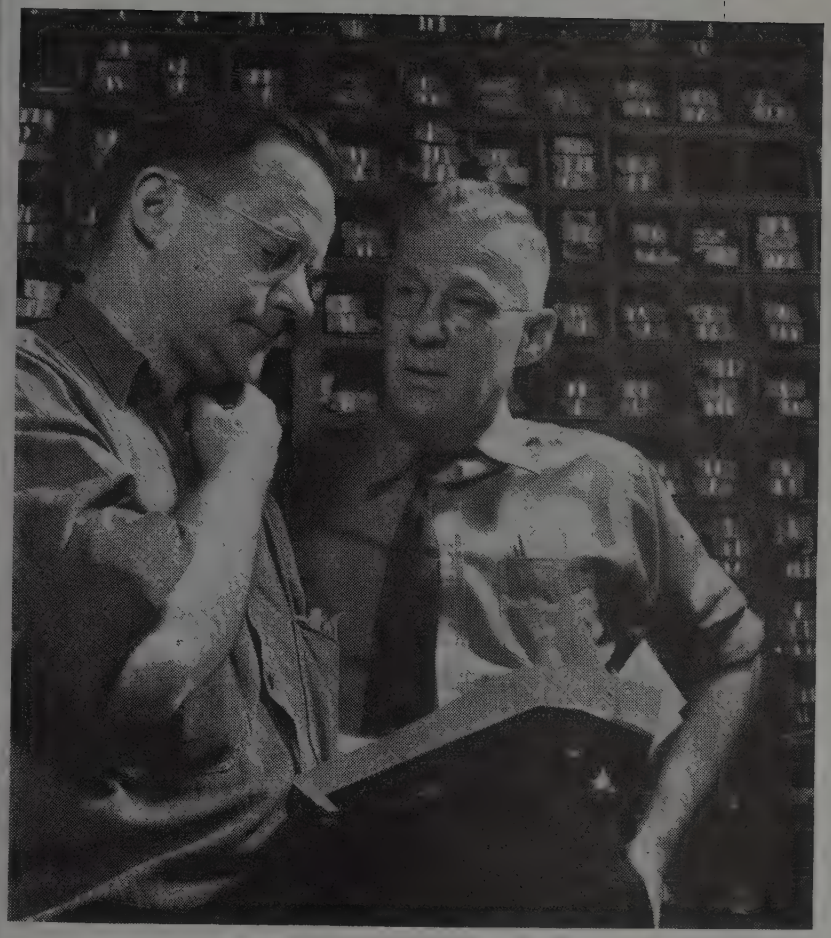
NEGLECT OF FOREMEN: Speaking at a district meeting of the Pressed Metal Institute in Philadelphia, William J. Meinel, president of Heintz Mfg. Co., declared that the success of a company's industrial relations depends largely upon on how well foremen are trained for their difficult jobs as liaison men between management and workers. He said that the position of foreman is especially important in large organizations where it is impossible for the top executives to have the close contacts with workers that is desirable.

This is another timely reminder that there is no satisfactory substitute for a close and sympathetic bond of understanding between the executives and the employees of a company. The larger the organization, the greater must be the dependence upon the foremen to exercise this important function. Generally speaking, industry in the past has been negligent in its training and treatment of foremen; otherwise the issue of unionizing foremen never would have attained its present status. —p. 69

SIGNS OF THE TIMES: Obvious catch in the Nathan report, which seeks to prove that subsidiaries of United States Steel Corp. could increase wages 21 cents per hour without increasing prices and with little effect upon profits (p. 63) is that Mr. Nathan uses U. S. Steel figures for a single quarter of 1946. The truth is that during the past five years, when sales were over nine billion dollars (highest in any five-year period in the corporation's history), net profit was only 3.7 cents of each sales dollar. After paying reasonable dividends to stockholders, this small net leaves an amount available for reinvestment in the business that is woefully inadequate for maintaining the properties in the healthy condition that is necessary if the workers are to continue to enjoy good wages and job security. . . . Shortage of tin in recent years has had a marked effect upon the container industry (p. 67), which is illustrated realistically by the present plight of paint manufacturers. . . . Vessel movement of the iron ore fleet on the Great Lakes this season (p. 115) will be aided considerably by the more extensive use of commercial marine radar equipment. In two months last season one radar-equipped ore carrier avoided 40 hours of delay, thereby saving $4000. . . . Several government agencies are plugging for making the territory of Alaska a state (p. 71) in order to stimulate its economic development and to increase national security. . . . Italy and France have signed an agreement under which 500,000 Italians will emigrate to France to augment its labor force (p. 74) at the same time that France is negotiating for the ultimate release by 1948 of 600,000 German war prisoners now within her borders. . . . Examination of the annual report of General Motors reveals that expenditures of $357 million for construction and special tools (p. 77) exceeded by $263 million the provisions which had been made for depreciation and amortization. This condition is common among automobile companies and some other manufacturers and is causing many of them to seek additional funds to replenish shrinking working capital. . . . Freight car awards in January and February totaled 23,632, or at an annual rate of more than 140,000 (p. 83), which is double the awards of 1946 and triple those of each of the three preceding years. . . . Persistent rumor hints that a reduction in the base price of steel (p. 64) is under consideration.

E. L. Shaner

EDITOR-IN-CHIEF



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RYERSON STEEL

Materials Industry's No. 1 Worry

Shortages of supplies supplant work stoppages as obstacles in production race. Coal mine "memorial" stoppage has little immediate effect on metals production

JOHN L. LEWIS' six-day "memorial" stoppage of soft coal mining last week caused little more than a ripple on the fast-flowing current of industrial production.

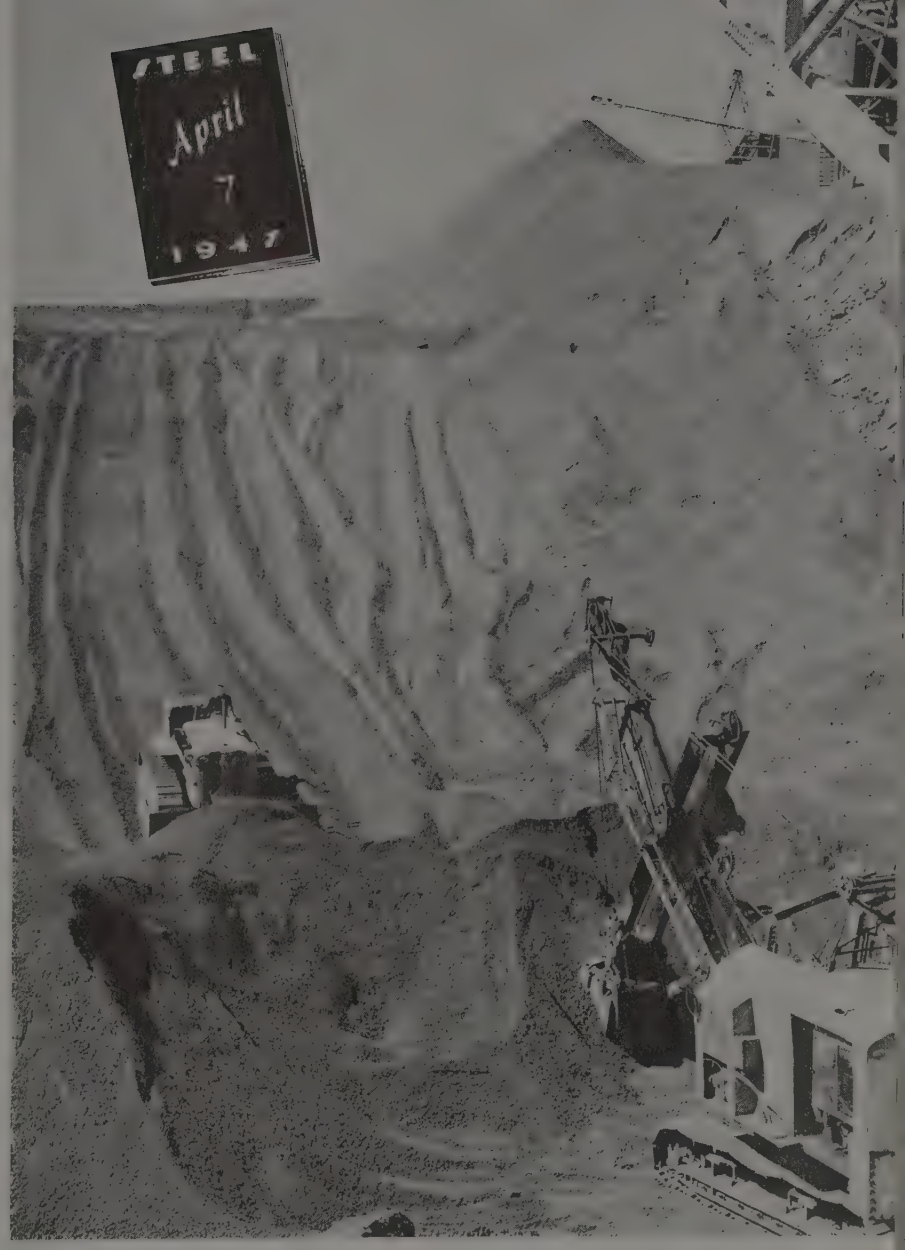
Industrial coal stocks at the beginning of the walkout were equal to a little more than a month's operations on the average and, due to the definite term of the mining holiday, few coal users found it necessary to reduce operations.

A few blast furnaces were curtailed. In the Pittsburgh district, beehive coke ovens of the H. C. Frick Co., supplying 20 per cent of the coke requirements of the United States Steel Corp. subsidiaries in the district, were shut down. This resulted in the curtailment of pig iron output by about 5000 tons daily, equal to the output of 5½ blast furnaces. At Youngstown, one blast furnace of Sharon Steel Corp. was banked for lack of coke.

Steel production, however, was not affected; in fact, a slight increase was made in the Pittsburgh district where the mine shutdown was most immediately felt. Metalworking companies generally had adequate coal stocks and suffered no immediate hardships as result of the holiday.

However, the loss of nearly a week's coal production pointed up the nip-and-tuck supply situation—or the actual scarcity—of practically all metallurgical raw materials, including coal, scrap, iron ore, copper, lead, and others, and emphasized the effect that any work stoppages affecting these materials could have on industrial output, presently establishing or approaching peacetime peaks.

The National Coal Association, Washington, estimates the coal stoppage cost the country at least 8 million tons of sorely needed bituminous coal. Some production would have been lost last week due to the observance of Mitchell Day on Apr. 1 and to Holy Thursday and Good Friday, so that normal output of nearly 13 million would not have been attained. However, the National Coal Association points out that in 1942, when Mitchell Day fell in the pre-Easter week, coal production amounted to more than 10.5 million tons for the five-day week which then was in effect.



Caterpillar diesel tractor and bulldozer moves iron ore from stockpile to loading hopper at the Patrick mine in Minnesota, as the mining district prepares to send a record peacetime tonnage of ore down the lakes

Effect of the six-day stoppage was to cut all coal stocks by an average of one-sixth.

At mid-week, Secretary of interior J. A. Krug ordered 518 soft coal mines closed indefinitely for reasons of safety. These mines are estimated to account for 17 per cent of total coal output, or about 350,000 tons daily. Presumably they will remain down until they are able to comply with the federal mine safety code. Krug's action was a point of victory for Lewis who called the stoppage to focus public attention on mine safety conditions.

Coal stockpiles on Great Lakes docks, where the lake shipping season is openings, were reduced to zero by the miners' holiday. At least ten days will elapse before coal in quantity becomes available for dumping into lake freighters for movement to upper lake points.

Coal shipping executives expect the lake movement of coal this year will reach 52 million tons. Shippers are not yet covered for more than 15 million tons, or 30 per cent of the season's requirements. Volume movement of coal on the lakes will not get underway until late in April, and unusually close co-

ordination of rail and vessel movement will be required this season.

Lake shipping, which was getting underway slowly last week, is expected to accelerate as rapidly as ice and weather conditions permit. Ice in the lower St. Marys River last week remained solid, varying from 18 to 25 inches, while in the upper river the ice was reported at 14 to 18 inches thick.

First bulk freighters left lower lake ports to load ore and limestone. Three of Inland Steel Co.'s fleet put out Apr. 1 from Indiana Harbor, two to load ore at Escanaba, Mich., and one to load limestone at Port Inland, Mich. Two Pittsburgh Steamship vessels cleared from Toledo Apr. 2 to load limestone at Calcite, Mich. Other vessels were loading coal at Lake Erie ports.

A major portion of the ore fleet is expected to move out within the next week to open what will be the busiest lake shipping season in peacetime.

The bulk fleet in addition to moving 52 million tons of coal to upper lake ports must bring down from 75 to 80 million tons of iron ore, a task which will require capacity operation. Statisticians figure that an average of 30 trips by the entire ore fleet will be necessary to bring down 79 million tons of ore.

Stocks of ore at lower lake docks and furnaces at the beginning of April had been reduced to around 18 million tons, a fairly low carryover for the beginning of a shipping season. Monthly consumption at current rate of steel production is in excess of 6½ million tons. Barring serious strikes or a major recession, this rate appears likely to continue for an indefinite period.

Adequate flow of raw materials now is considered by most steel and metalworking executives as the No. 1 problem in maintaining the high rate of operations which in the first quarter established many peacetime production records. In the minds of most, raw material supplies have thus moved ahead of labor relations, the chief headache of 1946.

MINE SHIPMENTS OF LAKE SUPERIOR IRON ORE, 1850-1946

(In Thousands of Gross Tons)

	MINNESOTA RANGES			MICHIGAN-WISCONSIN RANGES								
	Mesabi	Ver-milion	Cuyuna	Total Minn.	Gogebic	Mar-quette	Menom-inee	Baraboo & Mayville Wis. Dists.	Total Mich.-Wis.	Total U. S. Ranges	Total Lake Superior District *
1850 to 1900	31,390	15,191	....	46,581	31,201	59,833	34,033	327	125,394	171,975	172,040
1901	9,005	1,786	....	10,791	2,938	3,247	3,619	22	9,826	20,617	20,850
1902	13,331	2,084	....	15,415	3,659	3,865	4,613	80	12,167	27,582	27,885
1903	12,894	1,677	....	14,571	2,939	3,040	3,750	28	9,756	24,327	24,530
1904	12,157	1,283	....	13,439	2,399	2,852	3,075	94	8,420	21,859	21,977
1905	20,159	1,677	....	21,836	3,706	4,236	4,495	132	12,569	34,405	34,575
1906	23,821	1,793	....	25,614	3,642	4,057	5,110	144	12,953	38,567	38,689
1907	27,492	1,685	....	29,177	3,633	4,388	4,965	96	13,082	42,259	42,402
1908	17,258	842	....	18,100	2,700	2,414	2,679	122	7,915	26,015	26,166
1909	28,178	1,109	....	29,287	4,088	4,253	4,875	83	13,299	42,586	42,782
1910	29,200	1,203	....	30,403	4,316	4,393	4,238	92	13,039	43,442	43,630
1911	22,099	1,089	148	23,336	2,603	2,836	3,911	116	9,466	32,802	32,957
1912	32,045	1,845	305	34,195	5,006	4,203	4,711	104	14,025	48,220	48,308
1913	34,040	1,567	733	36,340	4,532	3,968	4,967	145	13,612	49,952	50,117
1914	21,468	1,017	868	23,352	3,569	2,492	3,222	106	9,388	32,741	32,949
1915	29,757	1,734	1,128	32,619	5,478	4,106	4,983	81	14,648	47,266	47,635
1916	42,526	1,947	1,716	46,189	8,490	5,410	6,365	219	20,484	66,673	66,903
1917	41,441	1,531	2,422	45,394	7,980	4,874	6,046	137	19,036	64,430	64,695
1918	40,399	1,193	2,479	44,071	7,937	4,354	6,379	98	18,768	62,839	63,027
1919	32,004	929	1,859	34,792	6,230	2,992	4,447	93	13,761	48,553	48,721
1920	37,150	1,007	2,192	40,349	8,763	4,608	6,569	130	20,070	60,419	60,583
1921	16,350	869	490	17,709	2,337	1,117	1,584	52	5,090	22,799	22,852
1922	28,064	1,212	1,496	30,772	6,221	2,818	4,079	110	13,229	44,001	44,015
1923	41,806	1,279	2,221	45,306	6,580	3,892	4,855	138	15,465	60,771	60,798
1924	29,142	978	1,469	31,589	5,160	3,175	3,837	135	12,307	43,896	43,896
1925	35,890	1,438	1,514	38,842	7,068	4,198	5,270	157	16,693	55,535	55,535
1926	38,251	1,586	2,083	41,920	7,537	4,435	5,946	132	18,050	59,970	59,970
1927	32,976	1,548	1,981	36,505	6,385	4,148	5,213	93	15,839	52,344	52,344
1928	35,899	1,671	2,098	39,168	6,540	4,299	4,842	7	15,688	54,856	54,856
1929	43,008	1,874	2,596	47,478	7,624	5,410	5,645	....	18,679	66,157	66,157
1930	31,067	1,885	1,929	34,881	5,064	3,634	3,609	....	12,307	47,188	47,188
1931	15,270	1,141	898	17,309	2,908	1,809	1,469	....	6,187	23,496	23,496
1932	1,935	217	99	2,250	673	357	308	....	1,338	3,389	3,589
1933	13,472	740	741	14,953	2,401	2,807	1,511	....	6,719	21,672	21,672
1934	14,650	785	533	15,968	2,287	2,474	1,335	....	6,096	22,064	22,064
1935	18,877	857	798	20,532	3,071	3,266	1,634	....	7,971	28,503	28,503
1936	31,459	1,064	1,305	33,829	4,630	4,628	2,164	....	11,422	45,251	45,251
1937	45,938	1,453	1,775	49,161	5,661	5,748	2,649	....	14,058	63,219	63,219
1938	13,304	930	582	14,816	2,278	1,476	980	....	4,734	19,550	19,550
1939	30,315	1,417	1,291	33,023	5,346	4,908	2,161	....	12,414	45,437	45,548
1940	45,668	1,547	1,734	48,949	5,976	5,920	3,103	....	15,000	63,949	64,310
1941	59,778	1,847	2,441	64,061	6,301	6,254	4,131	....	16,687	80,748	81,211
1942	70,280	1,925	3,036	75,300	6,238	6,541	4,930	....	17,709	93,009	93,496
1943	64,906	1,779	3,066	69,971	5,487	5,601	4,903	....	15,991	85,962	86,413
1944	62,509	1,589	2,538	66,586	5,604	4,790	4,876	....	15,271	81,857	82,356
1945	58,369	1,446	3,016	62,831	4,304	4,585	4,241	....	13,130	75,961	76,980
1946	46,336	1,330	2,354	50,020	3,717	3,270	2,591	....	9,578	59,598	‡61,035
Total	1,482,823	78,546	57,934	1,619,580	253,207	237,982	214,918	3,223	709,330	2,328,911	2,337,675

Compiled by The Lake Superior Iron Ore Association.
‡ Subject to final adjustment.
* Includes Canadian ore.

Work stoppages due to labor disputes currently are at one of the lowest levels in the postwar period. While many major disputes are in the process of negotiation, consensus of management and labor opinion is that most of these will be resolved without widespread work stoppages, at least in the industrial field.

Opinion is growing that the pattern of settlement may follow that indicated in the rubber industry and in meat packing and textile industries which recently have been settled on the basis of a 10 to 12 cent hourly wage increase. Nash-Kelvinator Corp. and the United Automobile Workers have agreed to a 10-cent hourly wage increase, with a proviso that the company will grant a further increase if the large automotive companies grant a larger increase.

Outcome of the negotiations between the basic steel industry and the United Steelworkers of America is being awaited by most nonbasic steel and steel consuming industries before concluding their own negotiations. The basic steel wage negotiations in turn have been held up by uncertainty over the liability under the portal pay suits filed by the union. Only three weeks remain to settle the steel wage issue under the contract extension, which expires Apr. 30.

Republic Steel Executives See No Early Demand Drop

Demand for steel, T. M. Girdler, chairman, and C. M. White, president, Republic Steel Corp., Cleveland, told stockholders in the annual report last week, continues abnormally high with no evidence of any decrease in the immediate future.

Gross sales and operating revenue for 1946 was $415,749,805, a decrease of approximately $85 million as compared with 1945. The steel strike early in 1946 represented a loss of 700,000 tons of steel production and $11 million in wages to Republic employees.

Net income was $16,033,469—5.3 per cent return on the investment and slightly less than 4 per cent on the sales dollar. Net income for 1946 was at the rate of $2.53 per share of common stock and for 1945 at the rate of $1.36 per share of common stock. Federal income tax provision for 1946 was $9,000,000.

Operations for 1946 were at the average rate of 70.3 per cent of capacity with ingot production at 6,260,047 tons compared with 7,545,825 tons for 1945.

The company had an average of 60,136 employees and total wages and salaries amounted to $160,358,889. This compared with wages and salaries in the preceding year of $169,212,896.

Republic's funded debt was reduced by $7,810,000 to $61,440,000.

"Little Nathan Report" Plugs for 21-Cent Increase for Steelworkers

Study of steel profits, prices and wages, made for CIO union, contends industry can afford substantial wage increases without much damage to profit position. Calculations based on continuing near-capacity level of operations

AN ARGUMENT for a 21-cent hourly wage increase is contained in the "Little Nathan Report," prepared by Robert N. Nathan, former government economist, for the United Steelworkers and relating particularly to wage controversy in the basic steel industry. The report supplements the much-criticized study on overall wages and profits released last winter.

The steel report, prepared several months ago, has been closely guarded and its details were revealed only last week, less than a month before the contract extension between the union and the steel industry expires.

The report purports to examine the price-profit picture of United States Steel Corp. and 19 other leading producers.

Nathan Has Five Conclusions

Nathan reaches five major conclusions:

1. The average steelworker must be paid better than 21 cents an hour more if he is to recover losses in "real wages" suffered during the past year.
2. U. S. Steel and the industry as a whole can afford to grant such an increase without suffering much damage in its profit position.
3. The profit position of the steel industry is perhaps more favorable now than at any time in its peacetime history.
4. The position of the steelworkers is worse now than it has been for many years.
5. A settlement of this situation must be reached by "reasoned negotiations on the facts without a crippling work stoppage."

The report blames the loss of real earnings on the increase in the cost of living. Where a year ago the actual average hourly wage was $1.29, an average of $1.51 would be required now if the worker is to buy as much with his wage.

Nathan contends that if U. S. Steel operates at 95 per cent of capacity, it can grant a 20-cent increase and still earn a profit, after taxes, of $181 million; if a 30-cent wage increase is granted, the report says, the corporation could earn a profit of $136 million.

If production fell to 75 per cent of capacity, the profit after a 20-cent increase would be $86 million, or $50 million after a 30-cent advance.

If output dropped to 50 per cent, Nathan continues, U. S. Steel could earn only $8 million after a 20-cent increase, would lose $31 million if 30 cents were granted.

Nathan calculates that with U. S. Steel running at 95 per cent of capacity the cost of each cent of hourly increase would be $5,300,000.

Concerning outlook for future profits, Nathan says: "The demand for steel presses on the limits of capacity. So long as the United States does not mismanage its economic affairs to produce a serious decline in effective demand and employment, there is cogent reason to anticipate very high-level operations in steel for years to come.

"Indeed the continuing level of requirements may well necessitate an expansion in the basic capacity of the industry.

"Steel prices are higher now than ever except during the runaway inflation of World War I. The profit outlook of the steel industry under the cost-price structure is entirely without precedent in our peacetime history and even above World War II levels."

Figuring on the basis of the third quarter of 1946, Nathan concludes that steel profits are 322 per cent greater than the average for 1936-39.

Summing up, Nathan says: "A heavy weight of responsibility rests upon both labor and management to conduct . . . negotiations in a reasonable way and with primary attention to the national interest. A prolonged dispute in the steel industry will create a national emergency."

Present, Past and Pending

■ C & O TO BUILD COAL PIER AT NEWPORT NEWS
NEWPORT NEWS, VA.—Chesapeake & Ohio Railway will build a third coal pier here at a cost of $5 million. New pier will have a rated capacity of 50 cars hourly.

■ SECOND QUARTER CARLOADINGS TO GAIN SHARPLY
WASHINGTON—Freight carloadings for the second quarter will be 33.2 per cent higher than in the comparable period last year, according to estimates compiled by the 13 Shippers Advisory Boards. Traffic a year ago was disrupted by the coal and other strikes.

■ ALCOA ASKS COURT RULING ON MONOPOLY CHARGE
PITTSBURGH—Aluminum Co. of America has asked federal district court to rule company no longer has a monopoly over the aluminum ingot market in the United States and to return final ruling in a 10-year-old antitrust case against it.

■ EXPECTS RECORD PRODUCTION OF STAINLESS STEEL
PITTSBURGH—Allegheny Ludlum Steel Corp. expects to produce 190 million pounds of stainless steel this year, exceeding the 1946 record of 140 million pounds.

■ BILLS PROVIDE FOR EXTENSION OF COPPER PREMIUMS
WASHINGTON—Extension of premium price plan for copper is provided in bills being considered by the House Public Lands Committee. Plan is scheduled to expire June 30.

■ STANDARDS ORGANIZATION CONSTITUTION RATIFIED
LONDON—International Organization for Standardization, set up provisionally at a meeting of 25 nations here last October, has become the official body of international standardization work, following ratification of its constitution and bylaws by 15 signatory nations.

■ INLAND PRODUCES 60 MILLIONTH TON OF STEEL
CHICAGO—Inland Steel Co. produced its 60 millionth ton of steel last week, in slightly less than 45 years. Twenty-one years was required to produce the first 10 million tons.

Steel Price Action Hinges on Wages

U. S. Steel's policy awaits outcome of wage negotiations, President Fairless says, denying rumors of imminent substantial reductions

SPECULATION over the immediate future trend of steel prices was at fever heat last week. Rumors were circulating throughout the country that the leading producing interest, United States Steel Corp., planned to announce a price reduction.

Late in the week, however, President Benjamin Fairless in response to newsmen's queries, stated that until current wage demands are disposed of no real consideration can be given by U. S. Steel to the adequacy or inadequacy of its present steel prices. He pointed out that in the collective bargaining negotiations now in progress one of the demands of the union is for a substantial wage increase, while other union demands, if granted, would add materially to the corporation's already heavy costs.

It has been reported in informed circles for the past several weeks that price policy has been under discussion by U. S. Steel top executives. At the same time, government authorities, including President Truman, have been bearing down psychologically on industry in general for price reductions. Consequently, it would not be surprising should U. S. Steel effect a downward revision even though current prices were not out of line with production costs.

Actually, base prices on finished steel have advanced only moderately since government price control ended, STEEL's current composite price on finished steel, $69.82, being up only $5.37 over the composite price of $64.45 in effect last November. Of course, upward adjustment in extras in December and January added considerably more to the total delivered price increase, the actual amount varying from customer to customer depending upon the extent to which extras applied on purchases.

Token Cut Expected

Current market opinion is inclined to the view any reduction made in prices in the near future by U. S. Steel will be no more than a token cut across the board of $1 to $2 per ton in base prices.

Last week's rumors largely were sparked by newspaper reports out of Washington, one of them to the effect the steel corporation had given the White House assurances that a price cut would be effected in a few days. However, White House spokesmen denied to STEEL's Washington editor such assurances had been given by anyone, while Washington representatives of U. S. Steel said they had been unable to learn the source of the report.

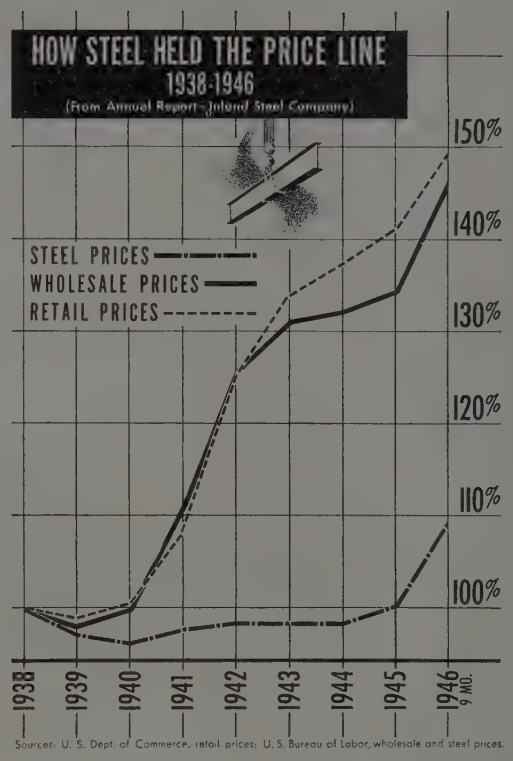
Reduction of steel prices by U. S. Steel, it was believed, would be followed by other steel producers and, in addition would thus serve as a brake on inflation generally. Some observers think the recent break of several dollars per ton in the price of scrap may incline steel producers generally toward lower prices. Last week, one interest, Central Iron & Steel Co., Harrisburg, Pa., announced an increase of $9 per ton in the base price of plates, explaining the increase as due to the high scrap prices. Central officials said that when scrap prices are reduced sufficiently, a downward revision in plate prices would be effected.

Currently steel producers in general are putting revised extra lists into effect conforming with the recent revision in cards announced by Carnegie-Illinois Steel Corp., U. S. Steel subsidiary. This extra revision resulted in both decreases and increases in delivered prices on specific products, but the overall effect was to reduce delivered prices up to as much as $10 per ton. Last week galvanizing extras on standard nails were raised $10 per ton and indications were revisions in extras for manufacturers wire would be announced within a few days. At the same time a producer in the Pittsburgh district announced a new classification of extras on cold-finished carbon steel bars, the new card reflecting and reconciling the recent changes made in the hot-rolled carbon bar card.

An important price development of the past week was an advance of $4 per ton on spiegeleisen by the Carnegie-Illinois Steel Corp. Still another move was the establishment of new West Coast base prices on sheets and structural shapes by the Columbia Steel Co., U. S. Steel subsidiary.

Meanwhile, operations in the so-called "gray" market for spot delivery steel are reported slowing down with consumers presenting an increasingly strong front to high-priced, "fly-by-night" broker offerings. As a matter of fact, in the past week or so it was reported brokers were showing signs of breaking down under the pressure being exerted, prices in the spot delivery market being off

(*Please turn to Page* 180)



STEEL INCREASE MODERATE: Comparisons in steel prices and in wholesale and retail prices generally are shown in this chart from the annual report of Inland Steel Co. Volume production and economical operation are credited for the modest advance in steel as compared with other products

Steel Operations Average 92.4 Per Cent in 2 Months

Production of steel in February declined to 6,421,862 tons, representing a slight downward revision from the preliminary total issued previously by the American Iron & Steel Institute (See STEEL, Mar. 17, p. 71). This compared with 7,212,677 tons in January. The industry operated at 91.7 per cent of capacity in February and at 92.4 per cent during the first two months of the year.

February's output consisted of 5,830,371 tons of open-hearth steel ingots and steel for castings, 314,712 tons of bessemer ingots, and 276,799 tons of electric and crucible furnace steel ingots and steel for castings. Included in these totals are 563,475 tons of alloy steel and 831,795 tons of hot-topped carbon ingots.

Steel output in February by districts was as follows: Pittsburgh-Youngstown, 2,591,352; Chicago, 1,444,304; eastern, 1,238,957; Cleveland-Detroit, 544,021; western, 321,192; southern, 282,036.

Shorter Month Cuts Output Of Pig Iron in February

Blast furnace operations held steady in February at the high rate attained in the preceding month, the rate having been 90.3 and 90.8 per cent, respectively, according to the American Iron & Steel Institute.

Due to the shorter month, however, total output declined to 4,549,628 tons from 5,071,369 in January. This brought output for the first two months of this year to an adjusted total of 9,636,814 tons compared with only 3,792,116 tons in the like 1946 period.

The small output a year ago was due to the strike of steelworkers which reduced blast furnace operations to only 34.8 per cent of capacity for the period.

Of February's output, pig iron accounted for 4,492,812 tons while ferromanganese and spiegeleisen accounted for 56,816 tons, making the totals for the first two months of this year 9,523,425 and 113,389 tons, respectively.

Stainless Steel Corrosion Research Being Pushed

Research on the corrosion of stainless steel and similar metals in a marine atmosphere is under way at the University of Texas under direction of Dr. Norman Hackerman, associate professor of chemistry.

The research, which was begun last September, is now dealing with why stainless steel corrodes when in contact with salts, such as in a marine atmosphere; determining the mechanism of the so-called corrosion inhibitors—that is, the chemical injected into the solutions around the metal to retard corrosion, and investigating why some metals and alloys are passive.

BLAST FURNACE OPERATIONS HOLD AT 90.3 PER CENT IN FEBRUARY

Blast Furnace Capacity and Production—Net Tons — February, 1947

	Number of companies	Annual blast furnace capacity	Production: Pig Iron — Current month	Pig Iron — Year to date	Ferro manganese and spiegel — Current Month	Ferro manganese and spiegel — Year to date	Total — Current month	Total — Year to date	Percent of capacity — Current month	Percent of capacity — Year to date
DISTRIBUTION BY DISTRICTS:										
Eastern	11	12,551,280	845,926	1,783,076	24,994	51,320	870,920	1,834,396	90.4	90.4
Pittsburgh-Youngstown	16	25,042,040	1,771,465	x3,767,624	18,748	38,368	1,790,213	x 3,805,992	93.2	94.0
Cleveland-Detroit	6	6,557,500	464,138	986,386	-	-	464,138	986,386	92.3	93.0
Chicago	7	14,097,710	959,548	2,011,394	-	-	959,548	2,011,394	88.7	88.2
Southern	8	4,924,670	285,526	639,430	9,569	19,213	295,095	658,643	78.1	82.7
Western	4	2,536,000	166,209	335,515	3,505	4,488	169,714	340,003	87.2	82.9
TOTAL	36	65,709,200	4,492,812	x9,523,425	56,816	113,389	4,549,628	x 9,636,814	90.3	90.7

FEBRUARY STEEL FOR CASTINGS AND INGOT PRODUCTION ANALYZED

Steel Capacity and Production—Net Tons — February, 1947

	Number of companies	Annual steel capacity	Production: Total Steel — Current month	Total Steel — Year to date	Percent of capacity — Current month	Percent of capacity — Year to date	Alloy steel * (Incl. under total steel) — Current month	Alloy steel * (Incl. under total steel) — Year to date	Carbon ingots—Hot topped (Incl. under total steel) — Current month	Carbon ingots—Hot topped (Incl. under total steel) — Year to date
OPEN HEARTH FURNACES:										
Ingots	50	x x x x x	5,818,171	x12,345,999	x x x	x x x	405,485	912,622	776,392	x1,692,113
Steel for castings	17	x x x x x	12,200	x 29,213	x x x	x x x	2,059	5,535	x x x x x	x x x x x
TOTAL	50	81,010,990	5,830,371	12,375,212	93.8	94.5	407,544	918,157	776,392	1,692,113
BESSEMER INGOTS	6	5,154,000	314,712	698,808	79.6	83.9	-	-	-	79
ELECTRIC & CRUCIBLE FURNACES:										
Ingots	47	x x x x x	267,539	x 542,916	x x x	x x x	149,540	x 313,296	55,403	109,046
Steel for castings	11	x x x x x	9,240	18,172	x x x	x x x	6,391	12,813	x x x x x	x x x x x
TOTAL	47	5,076,260	276,779	561,088	71.1	68.4	155,931	326,109	55,403	109,046
TOTAL STEEL	80	91,241,250	6,421,862	x13,635,108	91.7	92.4	563,475	x 1,244,266	831,795	x1,801,238
DISTRIBUTION BY DISTRICTS:										
Eastern	25	17,708,630	1,238,957	2,628,611	91.2	91.8	86,793	187,726	217,760	488,267
Pittsburgh-Youngstown	34	36,613,480	2,591,352	x5,583,831	92.3	94.3	306,001	x 674,988	319,540	681,616
Cleveland-Detroit	7	7,347,000	544,021	1,156,274	96.5	97.3	52,310	126,834	74,394	x 165,613
Chicago	16	20,409,720	1,444,304	2,989,424	92.2	90.6	113,192	241,503	204,786	429,659
Southern	9	4,322,220	282,036	609,252	85.1	87.2	792	1,533	7,379	16,871
Western	11	4,840,200	321,192	667,716	86.5	85.3	4,387	11,682	7,936	19,212
TOTAL	80	91,241,250	6,421,862	x13,635,108	91.7	92.4	563,475	x 1,244,266	831,795	x1,801,238

x Adjusted.

Industry's Pace Off on West Coast

Activity slackens with plateau in reconversion drive reached. Unemployment rises over last four months at San Francisco

SAN FRANCISCO

HERE AND there in northern California signs are appearing that industrial activity is reaching a plateau in the reconversion climb from war to peace.

Although the word "recession" frequently pops up in business discussions these days, indications thus far are entirely too inconclusive to base predictions of a general decline in activity. However, that there has been at least a temporary saturation point is shown in some recent developments.

Foremost of these is a report of the State Employment Service that unemployment in the seven counties of the San Francisco bay area has risen some 27,000 in the last four months—from 53,000 in November to 80,000 at present. Of the latter number, San Francisco alone now has 32,000 jobless, an increase of 8500 since November.

Employment Remains Stable

This increase in unemployment reflects inability of business and industry currently to expand its working force rather than a contraction in employment. That is shown by the fact that employment figures have remained relatively stable. The fact that the number of jobless has increased so sharply is due almost entirely to the continued heavy inflow of veterans and workers from other parts of the country.

From the standpoint of employers the easing of the labor market has permitted them to exercise a policy of selecting workers more carefully. And as competition for jobs increases, worker efficiency in many instances is showing a proportionate improvement.

Another straw in the industrial wind in this area is a decline in plans for industrial expansion. After showing sharp increases all through last year, announcements of new plant construction have started to level off.

For example, in February plans were announced for 49 new industrial plants and expansions of 29 existing plants at a combined value of slightly more than $5 million. In terms of construction value this is about half the total in February, 1946, when 51 expansions and 63 new plants were announced.

During the first two months of this year the total value of new plants and expansions was $18,315,500 compared with $18,647,800 in the first two months of 1946.

If these signs are heralds of a coming recession it is believed in most West Coast business quarters that such a setback will be only temporary. The market potential of the West Coast and California in particular still is growing at a faster rate than any other area in the nation.

California's population has increased nearly 50 per cent since 1940 and still is rising at the rate of more than 250,000 annually.

The expansion of a basic steel industry in the West is counted on to father scores of related industries in the form of fabricating companies. During the last two years the expansion of the western steel industry has resulted in the addition of 626 new plants in California alone.

In addition, even though there is a current slackening in new industrial construction plans, the backlog of construction already on books is so large it is estimated it can not be completed before 1960 at earliest. Thus building is expected to be a mainstay of the economy for many years to come.

SHIPYARD ADDITION: This $4 million project, a new shipfitting and boiler making shop at the San Francisco Naval Shipyard, will be completed and in operation by June. The 2½-story structure was contracted by Columbia Steel Co. and erected by American Bridge Co., both United States Steel Corp. subsidiaries. In background is huge crane, capable of lifting 500 tons, recently erected by American Bridge Co.

Cautious Attitude Prevails in Industry Circles in Southern California District

LOS ANGELES

CURRENT business statistics for southern California show variance with a general attitude of caution prevailing among business men. Factory employment in Los Angeles county is increasing, although moderately, after registering declines over a narrow range in the early weeks of 1947.

According to comment released over the last few days by the Security-First National Bank of Los Angeles and other leading financial agencies, the same yardstick shows similar upturns in general business. Only two negative notes have been mentioned. These are declines in real estate activity and an increase in business failures in the area.

On the latter score, failures so far this year have involved more than 100 companies with total liabilities of more than $5 million. This compares with less than half a million which figured in business failures in the first three months of last year.

Los Angeles now occupies either sixth or seventh place (the exact position is mildly controversial) among the nation's

major manufacturing centers in point of production workers employed.

Recent estimates made by federal and state agencies indicate that Los Angeles and Pittsburgh are tied for sixth place at present, the five largest being New York, Chicago, Detroit, Philadelphia and Boston—in that order.

Most recent estimates place the number of workers employed industrially in Los Angeles at nearly 250,000, which is more than half that of the entire state of California. Some 21 per cent of this number is employed in aircraft and aircraft parts. As between basic iron and steel industries, including automobiles, and the nondurable goods fields, some 60 per cent of the total number of workers are in the former and 40 per cent in the latter classification.

Tacoma Powdered Metals Co. Starts Production

The Tacoma Powdered Metals Co., Tacoma, Wash., is now in production, having remodeled the former plant of Rayonier Pulp Co. to its uses. Initial output will be 5000 pounds daily, increasing to 10 and 12 tons a day of high purity powdered iron.

Raw materials include scrap iron, hydrogen, hydrochloric acid and electric power. Tacoma was selected because of the availability of these items.

Hydrogen is piped into the plant from the adjacent Hooker Electro-Chemical operation. Shavings and borings are dumped into large concrete tanks to be treated by a solution of ferric chloride. As this flows from tank to tank it picks up iron from the scrap, changing to ferrous chloride. This liquid is pumped into electric cells containing copper anodes and stainless steel cathodes. The current passes through the cells as in a plating bath. Iron is deposited on the stainless steel cathodes and the liquor returns to the scrap iron tanks.

Iron deposited on the cathodes is scraped off, dried, washed and ground to a fineness a little larger than flour but smaller than sugar. It then passes through a hydrogen reduction furnace where the hydrogen picks up stray oxygen remaining in the iron. General Electric rectifiers, 1825 kw, are used.

Most of the equipment is standard but some of the machinery has been specially designed for this operation.

Frank Eichelberger, president, is a graduate of Ohio State University and Michigan College of Mines. He is a consulting engineer with mining experience in Arizona and formerly was with the Olin Corp. Jake Shoder, vice president, is a metallurgical and mechanical engineer, graduate of the Colorado School of Mines.

Production of Paint Held Down By Metal Container Shortage

Steel drums and pails reported in shortest supply by leading paint manufacturers. Deliveries of smaller size cans show improvement. Army surplus gasoline cans and other expedients being used

SHORTAGE of steel sheets from which cans, pails and drums are made is restricting paint manufacture, leading paint producers report. The container picture is spotty and all manufacturers would welcome a more even flow of containers from producers.

The current shortage of containers is particularly acute in the larger sizes, 5 gal pails and 30 and 55 gal drums. An easing in the supply of smaller cans, from ½ pt to 1 gal, has recently been noted. Until a short time ago shortage of these sizes was critical with most producers; now, however, supplies, while not in balance with demand, are improved.

The Bureau of the Census reports that in January shipments of metal cans for non-food uses increased over the December figure by about 8 per cent. Although this increase is not specifically in paint containers, it largely accounts for the current upward trend in receipts of this type can.

January Output of Drums Rises

Heavy type steel barrels and drums which are now in shortest supply with paint manufacturers were produced in greater quantity in January than in December, 1946, the bureau reports. Although production of these containers was up 11 per cent over December, demand for them, too, increased and the Jan. 31 order backlog stood at almost three times the Jan. 31, 1946, backlog.

Production of steel shipping packages, kegs and pails for sale in January was 18 per cent above the December level, according to the bureau, and unfilled orders increased over December and reached a point more than twice the order backlog of Jan. 31, 1946.

The government order prohibiting use of bales and ears (handles and sockets) on the smaller size cans has been removed, but can manufacturers occasionally ship new cans without these appurtenances because of shortages of wire, light gage sheets and even the rivets attaching the ears to the cans.

Many of the expedients resorted to during the war by paint producers to ease their container shortages have been abandoned. Many manufacturers who turned to glass containers when containers made of steel were not available have returned to almost complete reliance on metal containers.

To solve container shortages many other expedients have sprung up in the postwar period. Army 5 gal gasoline and water containers, better known as "blitz" or "jerry" cans, are being used to a limited degree by the industry. The smaller producers, in particular, are using them to some extent, and dealers in government surplus materials have also approached larger manufacturers with offerings of these cans.

One paint producer is now using 5 gal pails which were originally used for shipping soft drink concentrates. These pails are working very satisfactorily, this interest reports.

Price of used drums in the larger sizes has increased by about 33 per cent since OPA decontrol, but the increased cost to paint manufacturers is passed on to consumers, who resell the drums at approximately the same mark-up and thus lose little in the transaction.

During the war, difficulties in obtaining used and new drums were so acute that elaborate bookkeeping systems were instituted for keeping customers' drum accounts, and every effort was made to assure return of drums to the paint manufacturers. Because of the problem of cleaning drums returned under such a system, most paint producers now prefer to buy used drums from dealers.

Increased Demand for Cans Seen by American Can Head

Outlook for the can manufacturing industry for 1947 is extremely favorable and production must be greatly increased over prewar years to satisfy the increased demand, D. W. Figgis, president, American Can Co., Jersey City, N. J., indicated in his report to the company's stockholders at their annual meeting recently.

Industries that were restricted in their use of containers during the war are returning to use of metal containers as quickly as possible, Mr. Figgis said, and many of these industries have experienced growth since prewar years.

He predicted that American Can Co.'s dollar volume of business in 1947 could well be 50 per cent above the 1936-1940 average.

WAA Transfers Hand Tools for Vets' Use to VA

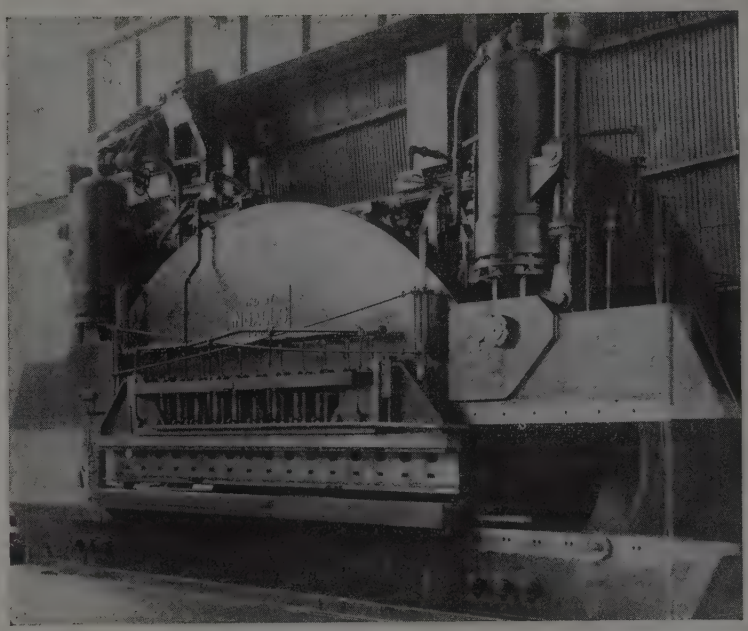
Approximately 250 types, valued at $1 million, to be made available for on-the-job training in three states

TO AID in the on-the-job training of veterans in eight occupations, War Assets Administration last week transferred $1 million worth of surplus hand tools to the Veterans Administration, Ralph H. Stone, deputy administrator, VA's Columbus, O., branch office, has announced.

Distribution of the tools, which will be used by veterans in Ohio, Michigan and Kentucky, will be made to trainees gaining skill on the job as machinists, metal workers, painters, carpenters and similar crafts. Some of the tools, which include approximately 250 different types, will be made available to veterans in hospitals for prevocational training in leathercraft, watchmaking and other trades.

Tools valued at approximately $500,000 are being allocated to the VA regional office in Cleveland and Cincinnati; $350,000 worth will go to the Detroit office and $150,000 worth will be distributed by the Louisville office.

From the tools obtained by VA, 14,600 separate kits will be assembled for use by the veteran trainees. These kits will be stocked in regional and subregional offices and will be available immediately upon requisition by VA training officers.



HEAVY DUTY PRESS: Designed and produced by the Ingalls Iron Works Co., Birmingham, Ala., this steel press exerts a pressure of 600 tons, handles shapes up to 30 ft long, and makes possible heavy jobs which formerly could not be handled in the South

Machine Tools Lead WAA's Surplus Stocks in February

Machine tools, electrical equipment and clothing and apparel led all other surplus goods in inventory value at the end of February, War Assets Administration reported recently.

Following are the confirmed inventory values of WAA's 20 largest sales sections: Machine tools, $567,000,000; electrical equipment, $151,000,000; clothing and apparel $139,000,000; iron and steel, $128,000,000; textile products, $93,000,000; general hardware, $89,000,000; motor trucks, $89,000,000; internal combustion engines, $74,000,000; materials handling equipment, $73,000,000; nonferrous metals, $68,000,000; safety equipment, $61,000,000; metal forming and cutting tools, $58,000,000; steam equipment, $57,000,000; valves and fittings, $55,000,000; cutting tools, $54,000,000; metal processing equipment, $52,000,000; heavy construction machinery, $48,000,000; electrical supplies, $47,000,000; textile fabrics, $47,000,000; and recreational equipment, $45,000,000.

Sheffield Corp. To Buy Murchey Machine & Tool

Arrangements to purchase control of Murchey Machine & Tool Co., Detroit, have been made by the Sheffield Corp., Dayton, O., officials of the latter company announced last week. The Murchey company manufactures machine tools, principally threading tools, thread chasers, die heads and collapsible taps. Purchase price was not revealed.

Acquisition of the Murchey concern, which has been active in the machine tool industry since its formation in 1904, will be the third recent expansion of Sheffield's activities. Threadwell Tap & Die Co., Greenfield, Mass., was acquired last year, and plans are underway for establishment of an Australian subsidiary at Melbourne.

Sheffield, through the Murchey purchase, will produce almost every type of screw thread production equipment.

Increased Ordering of New Tools Noted in Cleveland

Cleveland—Downward tendency in new machine tool buying, which has been particularly evident during the winter, appears to be reversing and increased activity is noted by tool builders and dealers in the area. At least one large prospective buyer of tools is approaching the ordering stage with much interest in the trade centering around his requirements.

Stability of prices of new tools is indicated by elimination of escalator clauses in many of the new contracts. Such clauses, however, are still widely used in sales of electrical components, which due to copper scarcity, will not be available for about one year.

License Policy for Swiss Machinery Delays Shipment

Washington—Deliveries of quantities of watch-making machinery from Switzerland to American firms is being held up due to a change in policy regarding sale of such equipment on the part of the Swiss makers, it has been learned here.

According to reports, Swiss makers plan to permit no further sales of specialized equipment manufactured by them, but instead will license such machinery to foreign users. The new policy is reportedly already in effect with British users. Meanwhile, American companies, some with orders of long standing for the precision instruments, are unable to get deliveries.

Pressed Metal Group Discusses Labor Relations

Need for well-trained foremen stressed by speaker at recent Philadelphia district meeting of Pressed Metal Institute

DECLARING that a smoothly functioning, well-organized shop from the operational standpoint is one of the great needs of the pressed metal industry, William J. Meinel, president, Heintz Mfg. Co., Philadelphia, said recently that able foremen qualified to represent management at the worker level are an important key to the whole situation.

Speaking at a district meeting of the Pressed Metal Institute in Philadelphia, he emphasized that good industrial relations depend largely on how well foremen are trained for their difficult jobs as liaison men between management and workers. The position of foreman is especially important in large organizations where it is impossible for the top executives to have the close contact desired with the rank and file of workers.

Mr. Meinel also spoke of research and development work in the pressed metal industry, as not only a desirable but a necessary part of industrial advancement.

"A fine example of the results that can be obtained through research is the cold extrusion of steel with tolerances held to .001" and with little or no loss of material. A year ago we would have said such press work was impractical or impossible. Germany early in the late war, faced with the absolute necessity of saving raw materials, developed thorough research methods for producing component parts of ammunition from raw material little in excess of the weight of the finished unit.

"We now have the benefit of this research and companies will soon be able to make thousands of items on presses with a material loss of not over two or three per cent. When the Heintz Mfg. Co. has completed its study of this German technique it proposes to make findings available to the entire industry."

American Zinc Institute Holds Meeting Apr. 28-29

Preliminary program for the American Zinc Institute's 29th annual meeting, which will be held at the Hotel Statler, St. Louis, Apr. 28-29, includes a report on the domestic and foreign slab zinc supply by T. H. Miller, assistant director, Bureau of Mines, and a talk on the world's zinc ore supply by George C. Heikes, Mines Inc., the institute announced last week.

Other topics and speakers at the meeting will include: Julian D. Conover, American Mining Congress, who will review the Washington situation; Ted Sills, Chicago public relations counsel, speaking on "The Public in the Picket Line;" Col. O. O. Niergarth, Army-Navy Munitions Board, discussing "Stockpiling and Industrial Planning."

Steel Warehouse Meeting To Be Held in Los Angeles

Postwar developments and opportunities among steel warehouse distributors will be analyzed and discussed at the 38th annual meeting of the American Steel Warehouse Association, to be held at the Biltmore in Los Angeles, May 12, 13, 14 and 15, Walter S. Doxsey, president, announced last week.

Business meetings will be featured by top-flight speakers including W. M. Jeffers, vice chairman, Union Pacific Railroad and former administrator of the wartime rubber program; Reece Taylor, president, Union Oil Co. and former director of the Steel Division, War Production Board; and Earl L. Shaner, president of Penton Publishing Co. and editor-in-chief of STEEL.

Improvements in warehouse construction and operation will be depicted by views from a number of new postwar warehouses.

Eastern members will travel to Los Angeles on a special 14 car train from Chicago and in special cars from other points such as New York, Philadelphia, Washington and Houston. Attendance of West Coast members will bring the total to approximately 600.

Members and their wives and guests will be entertained by California members. Chairman of the California Committee is E. Jungquist, Percival Steel & Supply Co., Los Angeles.

Calendar of Meetings . . .

Apr. 7-10, National Association of Corrosion Engineers: Convention at Palmer House, Chicago. Program committee chairman is Dr. R. B. Mears, 905 Southern Standard Bldg., Houston, Tex.

Apr. 8-11, American Management Association: 16th annual packaging exposition, Convention Hall, Philadelphia. Alan S. Cole, 330 W. 42nd St., New York, is advisory committee chairman.

Apr. 9-11, Society of Automotive Engineers: Spring aeronautic meeting, Hotel New Yorker, New York.

Apr. 9-12, Electrochemical Society Inc.: Louisville Congress, Brown Hotel. Colin G. Fink, 3000 Broadway, New York 27, secretary.

Apr. 10, Chamber of Commerce of the United States: One-day conference, Indianapolis, on employee pensions and profit-sharing plans. Held in collaboration with Indianapolis Chamber of Commerce and Indiana State Chamber of Commerce.

Apr. 14-17, Second Southern Machinery and Metals Exposition: Atlanta Municipal Auditorium, Atlanta, Ga. Managing director is Michael F. Wiedl, Box 4687, Atlanta 2.

Apr. 16-18, Society of Automotive Engineers: Transportation meeting, Hotel Stevens, Chicago.

Apr. 21-23, National Open Hearth Steel Committee of AIME: Thirtieth annual conference, Netherland Plaza Hotel, Cincinnati. Committee headquarters are at 29 W. 39th St., New York.

Apr. 28-29, American Zinc Institute: 29th annual meeting, Hotel Statler, St. Louis. Headquarters are at 60 E. 42nd St., New York 17.

Apr. 28-May 1, American Foundrymen's Association: Annual convention, Book-Cadillac and Statler hotels, Detroit. Association headquarters are at 222 W. Adams St., Chicago.

Apr. 29-30, May 1, Industrial Packaging Engineers Association: Second annual exposition, Hotel Sherman, Chicago. Managing director is C. J. Carney Jr., 20 W. Jackson Blvd., Chicago.

May 1-2, Society of Automotive Engineers: Personal aircraft meeting, Hotel Lassen, Wichita, Kans.

May 5-9, American Gas Association: Industrial Gas School, Seneca Hotel, Columbus, O. Chairman is Karl Emmerling, 420 Lexington Ave., New York.

May 5-11, Society of the Plastics Industry: Second National Plastics Exposition, Coliseum, Chicago. Society's headquarters are at 295 Madison Ave., New York.

May 8-9, Magnaflux Weld Inspection Conference: Congress Hotel, Chicago. Sponsored by Magnaflux Corp., Chicago.

May 11-14, American Supply & Machinery Manufacturers' Association Inc.: 1947 Convention, Hotel Traymore, Atlantic City, N. J. R. Kennedy Hanson, 1108 Clark Bldg., Pittsburgh, general manager.

May 12-15, American Steel Warehouse Association: 38th annual meeting, Biltmore Hotel, Los Angeles. Association president is Walter S. Doxsey, 442 Terminal Tower, Cleveland.

May 12-15, American Mining Congress: 1947 annual coal convention and exposition in Cleveland. Association secretary is Julian D. Conover, 309 Munsey Bldg., Washington.

May 15-17, Society for Experimental Stress Analysis: Annual meeting, Stevens Hotel, Chicago. Society's address is P.O. Box 168, Cambridge 39, Mass.

May 18-24, World Trade Week: Sponsored nationally by the Chamber of Commerce.

May 21-22, American Iron & Steel Institute: 55th general meeting, Hotel Pierre and the Waldorf-Astoria, New York. Institute headquarters are at 350 Fifth Ave., New York 1.

May 21-24, American Society of Mechanical Engineers: 19th national conference on oil and gas power, Cleveland.

May 22-24, Automotive Engine Rebuilders Association: Silver anniversary convention at Hotel Statler, Detroit. R. G. Patterson, 415 N. Capitol Ave., Indianapolis, is association executive vice president.

May 22-31, Mid-America Exposition: Cleveland Public Auditorium; show of goods made and used in area bounded by Detroit and Buffalo, Cincinnati and Pittsburgh.

May 26-27, Association of Iron & Steel Engineers: Annual Spring Conference, Benjamin Franklin Hotel, Philadelphia.

May 26-29, American Society of Mechanical Engineers: Aviation meeting, Los Angeles.

May 27, Metal Powder Association: Third annual spring meeting at Waldorf-Astoria Hotel, New York. Association headquarters are at 420 Lexington Ave.

Windows of Washington

By E. C. KREUTZBERG — *Washington Editor, STEEL*

Anticommunism legislation expected to aid in purge of reds from government and labor union leadership. Testimony before Un-American Activities Committee discloses strength of subversive elements. Committee's report submitted to Congress

ALTHOUGH much gloomy testimony regarding the strength of communists in the United States has been heard of late, there is evidence that this situation at long last is on the verge of being cleaned up.

First, the administration is firmly on record as opposing the further spread of communism in various exposed parts of the world, and as being determined to stamp it out in the United States. There is little doubt that President Truman's order to purge the government service of disloyal and subversive employees will be executed in full; it probably will require some specific legislation before the purge program can be carried out effectively, but that will be forthcoming as soon as Congress, via the Un-American Activities Committee, determines the course of procedure that will best insure the country's security.

Second, the testimony of witnesses before the committee reflects two gratifying recent developments. One is that the people are aroused to the communistic threat, and holders of high political offices are doing something about the matter. The other is that red all of a sudden has become an unstylish political color. This was demonstrated on various occasions when a number of prominent politicians who a few years ago were definite "left-wingers" proved by their testimony that they are having no truck with communism.

Michigan Purges Communists

One of the most effective witnesses was Gov. Kim Sigler of Michigan who promised to give the committee a list of 100 or so of the "most notorious communists who have made great progress in gaining control of labor unions in Michigan" and "are carrying out the very spirit of communistic gospel by attempting to destroy the industry that has made Michigan great." Governor Sigler told of the efforts which his administration has in motion to rid the state of the communistic yoke. He declared that many "stalwart and fearless labor leaders and rank and file members" of the labor unions are fighting to throw out the communists. "These men need help and need it badly," he said. But they can do a lot more under the proper kind of legislation.

Preliminary findings of the committee, embodied in a 26,000-word report to Congress, concerned mainly the strength of the red movement. The reds, says the report, have established "totalitarian bridgeheads" in labor unions, government, political parties, newspapers, radio and schools and colleges in this country, and have established in 67 other countries groups which, like that in the United States, take their orders from Moscow.

The report did not indicate what kind of legislation the committee will eventually recommend, but on the basis of informal statements by several of its members, there is no present intention to outlaw the Communist party. Prevailing sentiment is that, as suggested to the committee by J. Edgar Hoover, such a law would violate constitutional rights of the individual and pave the way for possible similar action against other groups at a later date. Rather, some of the committee members feel, the legislation finally adopted should outlaw specified acts and courses of conduct rather than political beliefs.

Meantime, the House Labor Committee, in drafting proposed amendments to the National Labor Relations (Wagner) Act, continues to lay stress in its executive sessions on the story about the factors in the Allis-Chalmers strike which it gathered from various witnesses. The committee is discussing, and may include in its bill, a provision that would deny Wagner Act rights to communist-dominated unions.

One of the highspots in the Un-American hearings occurred when Secretary of War Patterson told the committee that the Army last year instituted a policy of refusing to commission officers with communist tendencies. He said he now knows of "no officers in key positions whose loyalty is doubted." Some of the committee members may decide to go further in this direction and add the War Department to the list of organizations to be investigated. At present labor unions and the motion picture industry are due for the spotlight.

Manufacturers will get a chance to air labor relations complaints at House

UNDER ATTACK: Edgar L. Warren, left, director of the United States Conciliation Service who has been under congressional attack for alleged association with communist sympathizers, is shown with Sen. Joseph Ball (Rep., Minn.), chairman of the Senate Labor Committee. NEA photo

Labor Committee hearings to be held in the field as soon as the currently contemplated labor law amendments are out of the way. The committee will hold hearings at various cities. It hopes to obtain information that it can use in preparing such additional labor legislation as may be desirable from a long-range point of view. One of the angles which may be uncovered at these hearings is that involving featherbedding and makework union practices. The committee is eager to give serious consideration to any definite complaints it receives under this head.

Concerned Over Prices

Pessimism in the administration as to the economic outlook has been more pronounced the past few weeks. Current expectation is that unless there is an immediate trend toward lower prices there will be a recession in business this summer caused by a buyers' strike. That was what President Truman had in mind when, in a press conference, he expressed the hope that businessmen would read the handwriting on the wall and start marking down prices on their goods.

The President's Council of Economic Advisers now is working up a report on the price and wage trends since V-J Day and the council's head, Dr. Edwin G. Nourse, gave the tip-off as to its probable nature by remarking that decisions by American business executives since V-J Day "have not added up to anything like a workable solution of the nation's business problems."

Just what the President will do with the report after he receives it remains to be seen. With price controls in the discard, there is little he can do except publicize the findings and utter another warning.

Jet Bombers Ordered

Illustrating the rapidity of present-day developments in the field of aviation, the Army Air Forces has designated as standard operational equipment the jet-engine propelled bombers now being built by North American at Inglewood, Calif. North American has a contract for producing 96 of these huge craft which compare in size with the heavy bombers of World War II even though they now are described as "medium" bombers. They have wing span of 89½ ft, length of 74 ft and are 25 ft from the ground to tail top. Known as the XB-45, the new bomber is powered by four General Electric-designed J-35 jet engines manufactured by the Allison Division of General Motors.

While the Army Air Forces is unwilling to divulge the speed, it is so high that "the heat in the cabin generated by the friction of the airplane would make crew members uncomfortable at low altitudes with no cooling system." Payload of the XB-45 is reported as "substantially more" than that of the wartime heavies. It is designed primarily to travel at high altitudes and, despite many special operating devices, requires a crew of only four men.

Basing Point Cases Pend

Considerable progress is slated in regard to pricing systems involving basing points, with indications that court decisions further clarifying the present understanding of the law in this respect should be handed down prior to the summer of 1948.

Leading the list is the cement price case. The Supreme Court has consented to review the decision handed down by the Seventh Circuit Court of Appeals on Sept. 20, 1946, and it is expected to tackle this case next October.

Current indications are that hearings will start before the Third Circuit Court of Appeals, Philadelphia, in October on the long-pending steel basing price case, and at the same time before the Seventh Circuit Court in Chicago on the Rigid Steel Conduit case.

In addition, three important cases are now before the Federal Trade Commission for such future action as may be ordered. These are the National Lead Co. case involving zone delivered prices, the refractory brick case involving basing points and zone delivered prices, and the metal lath case involving zone delivered prices.

Another important price case on which further action is slated for the fall of 1947 is that involving the question of whether it is illegal to sell gasoline at a wholesale discount to dealers who do part of their business at wholesale and part at retail. This is the Standard Oil of Indiana case now before the Seventh Circuit Court of Appeals, Chicago.

Statehood for Alaska?

How to get more people to live in Alaska has been receiving increasing attention in Washington in recent months. The purpose is twofold: First, to stimulate the national economic growth by deriving a larger contribution from this hitherto almost untouched area; and second, to strengthen Alaska for purposes of greater national security in case World War III is launched across the polar ice cap as the military authorities expect.

The House Public Lands Committee will start hearings Apr. 16 on the Statehood for Alaska bill, and proponents are prepared to offer a strong story. They will point out that Alaska, with about one-fifth the area of the continental United States, has resources to support many times the 90,000 people who live there now. They will recall how North and South Dakota, Montana, Washington, Minnesota, Nevada and Iowa all had smaller populations when they were admitted to the union. Just as admission to statehood was followed by great stimulation in these states, they will contend, so Alaska will reflect rapid growth.

A number of moves now under way are aimed at stimulating the Alaskan economy and attracting more people there. The most important is a campaign now being readied by the Department of Agriculture Forest Service to exploit the huge timber resources of southeastern Alaska.

Another important move is the recent act of Congress which authorizes the Maritime Commission to arrange for adequate ocean transportation to and from Alaska. A fleet of 25 vessels, about the same number now being operated by the commission, is envisioned, but under private operation.

Plugging for the statehood bill is the Department of the Interior which now has extensive development plans for the territory. One of them is complete rehabilitation of The Alaska Railroad. Another is a big highway program for both civilian and military purposes. The War and Navy Departments, which are in Alaska to stay, and which want a substantial economy there, are helping the progress with their own expenditures.

Reports on Shipbuilding

The Maritime Commission has issued a report setting forth statistics for the advice of the new five-man Merchant Marine Advisory Committee appointed by President Truman to investigate and report on our current ship needs.

"At the outbreak of World War II," says the Maritime Commission report, "there were 162 passenger vessels with a total capacity of 56,516 passengers under American registry. Of this number more than one-third were more than 20 years old—the age limit set by the Merchant Marine Act of 1936.

"Today, the total is 91, capable of carrying only 27,017 passengers, and of these only 21, with an aggregate carrying capacity of 4359 passengers, are now actively in operation. Of the remaining vessels, 53 with 16,453 passenger capacity, are in inactive status because of inability to meet present safety requirements of the Coast Guard. Seventeen passenger-cargo vessels, capacity 6205 passengers, are under reconversion from war service or being repaired."

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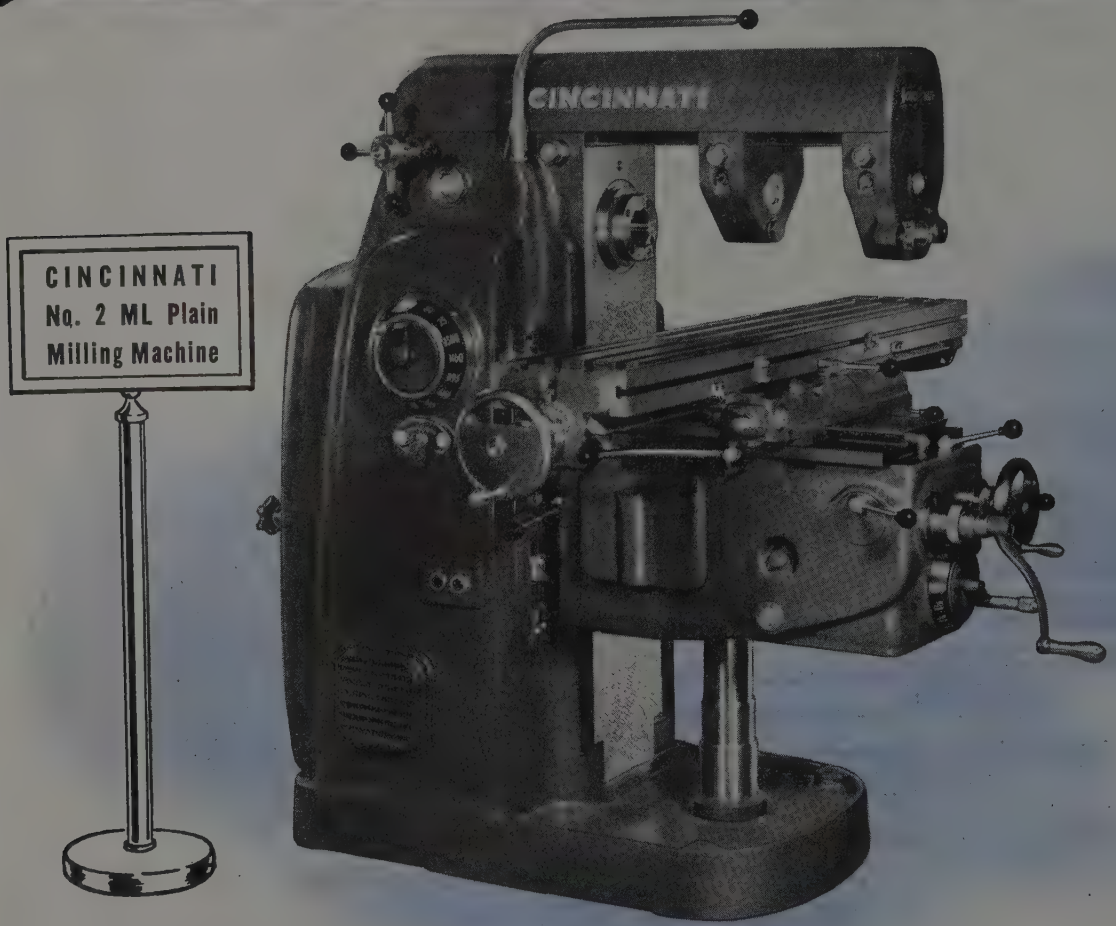

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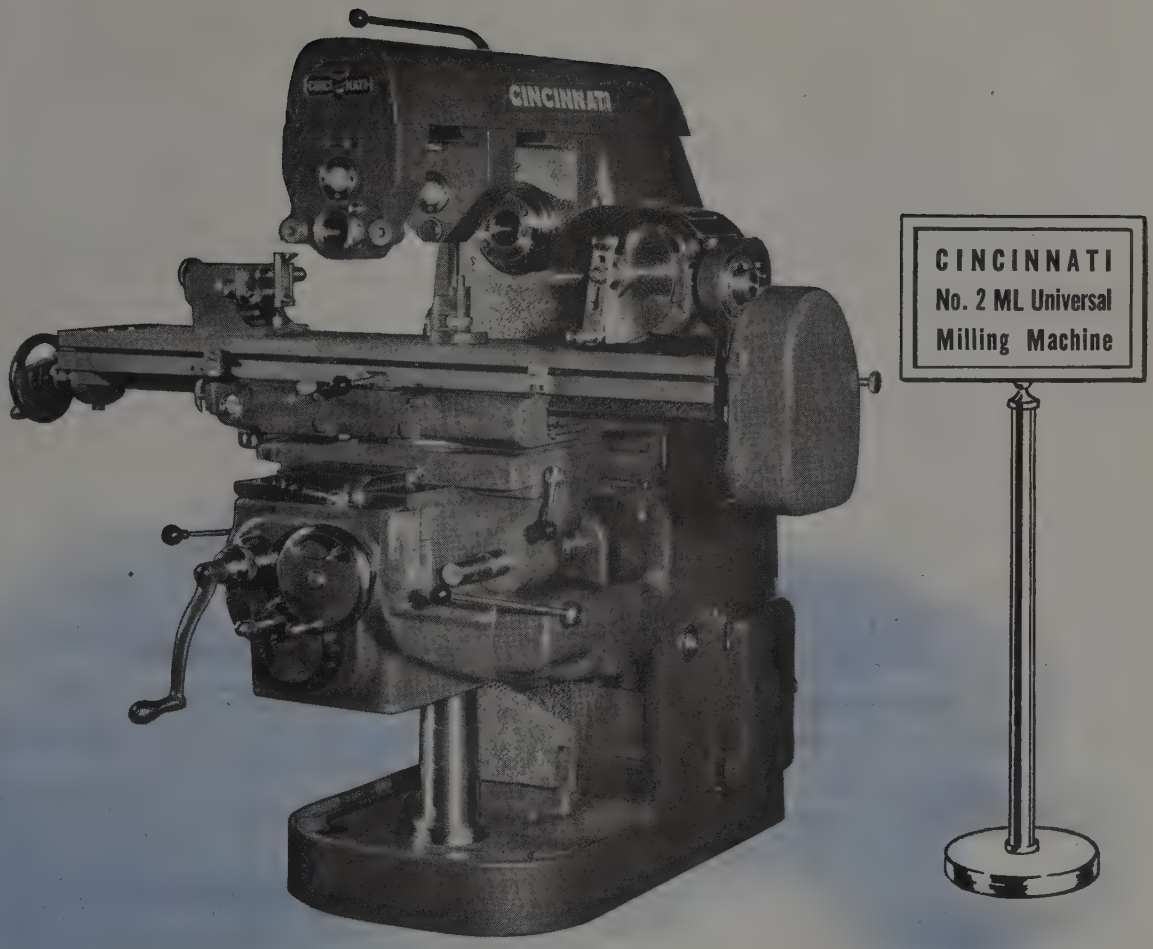

Here's a new milling machine — the CINCINNATI No. 2 ML — that's just right for your milling operations within 3 h.p. cutting capacity on a variety of work. ¶It's a companion machine to the popular No. 2 MI. Quite naturally, it has all the features of the No. 2 MI, and offers all the advantages so important to economical shop practice. Through wide speed and feed ranges, it offers top cutting efficiency when using small two-lip end mills or fairly large face mills. You'll appreciate the ¼" feed rate for mill-saw operations on high speed steel; or the 30" feed rate when routing out an aluminum pattern. There are many other cost-reducing features, too. And operators like the 2 ML because it's safe, it's easy to operate, it requires a minimum of daily service attention. ¶May we send complete information to you? The 2 ML's are built in Plain and Universal styles. Write for catalog M-1507-1.

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France To Admit Italian Workers Under New Pact

French deliveries of sheets and plates grow more extended. Demand far exceeds supply, despite increased output

PARIS

ITALY and France have signed a treaty under which 500,000 Italians will emigrate to France. Treaty will permit 17,000 Italian workmen to go into France each month until a total of 200,000 has been reached. Their families are expected to swell the total number to 500,000.

France wanted miners, millhands, masons and farmers, but the Italian workers are unskilled and will have to be trained after they reach France. The treaty will permit workers to send home 40 per cent of their earnings if they are single or if their families remain in Italy, and 20 per cent if their families accompany them to France. Money sent back by emigrants is a major source of the foreign currencies that Italy badly needs.

Steel deliveries in France are growing more extended, particularly for sheets and plates. Heavy plates are quoted for delivery in five or six months, light plates for 12 to 14 months and sheets for 18 to 20 months.

Production figures for February (in thousands of metric tons) are as follows:

	Pig iron	Steel	Rolled Products
January	404	478	363
February	361	440	327
	Bessemer	O. H.	Electric
January	269	168	40
February	238	164	36

Plate and sheet requirements are heavy and are equal to six times the production of sheets and four times the production of plates. It is probable that a new regulation will be enforced and special points for plates and sheets will be issued in place of the ordinary steel points. However, this situation could be greatly improved by an increase of plate and sheet output. Mechanical equipment has been ordered in the United States, including automatic catcher tables for the plate mills; this system will increase output until the erection of the continuous mill provided for in the Monnet plan for reconstruction. But during the period of installation of these tables, the plate mills will have to be stopped and will be idle for some time. It is expected that they will be completed by the end of the year.

The French Finance Minister drew a dark picture some days ago of France's financial situation, both as regards the balancing of the 1947 budget and the difficulties in the way of catching up with foreign payments. He said that the balancing of the budget had been completely upset by an increase of wholesale prices at the end of last year and by the increase of certain subsidies to compensate the price cuts decreed by the government. He said that a great economy effort had already been made and he pointed out that the only way to increase exports, and thus to prevent France's foreign payments from running away with her gold and foreign reserves was to increase production, and he indicated that one means was to prescribe the 48 hour week instead of the present 40 hours.

French Imports More Than Double Exports in 1946

In 1946 France imported goods to a total value of $1,950 million. 78 per cent of these imports came from foreign countries and 22 per cent from French colonies. French exports total $845 million, of which foreign countries absorbed 67 per cent and the French colonies 33 per cent.

Of this total France imported goods from the United States valued at $544 million. Her products exported to the United States amounted to $52 million.

The principal goods imported by France were:

Foodstuffs	$127,000,000
Iron and steel	19,483,000
Petroleum	35,042,000
Coal	39,775,000
Machinery	94,235,000
Automobiles	15,275,000

France May Release 600,000 German Prisoners

PARIS

Despite strong opposition from the French Communist party the French Foreign Ministry will open negotiations leading to the ultimate release by 1948 of 600,000 German war prisoners now working in France and loaned to France

MODERN CARS FOR BRAZIL: Plans and specifications for 63 modern streamlined all-stainless steel railway cars to be built by the Budd Co., Philadelphia, for the Estrada de Ferro Central do Brasil are discussed by executives of the railroad and the manufacturer. Seated are, left to right: Thomas Duff, head of Budd's foreign sales department; Dr. Renato de Azevedo Feio, president of the Brazilian road; Maj. Gen. Gladeon M. Barnes, vice president in charge of engineering for Budd. Standing: W. M. Lopes, Brazilian representative at the United Nations conference on transportation; Halton A. Coward, secretary of the Budd Co.; and A. Almeida Rego, assistant to Dr. Feio

the U. S. Army. However, in view of e acute manpower shortage, especially the northern coal districts, where rman PW's have been employed, ance is seeking to substitute displaced rsons for the returnable prisoners. This ve is part of a desperate drive to ain enough manpower in the country carry out the Monnet plan for recon- uction, which presupposed the use of rman prisoners when it was drawn up. V miners are responsible for 25 per nt of the national coal production.

elgian Steel Production till Hampered by Weather

Due to bad weather, production in e Belgian industries decreased during nuary and February, and the effects the severe winter were still being felt March.

Transport has been difficult, and as a nsequence, raw materials, coal and ke have been in short supply. The pply of electric power was also af- ted, and cuts had to be made locally.

Recently the government resigned ow- g to the resignation of the four com- nist ministers, who refused to endorse e government's proposals to increase e price of coal to 629 francs ($14.30) metric ton. They had agreed to a ice of 600 francs, and, while the extra francs were to make up for the with- awal of the government subsidy to the nes, the communists insisted that a gher price than 600 francs was con- ry to the general policy of keeping wn the cost of living. It is expected compromise will be arrived at. In y case, the price of steel is bound to up as a result of the increased price.

Iron and steel export trade in Bel- m and Luxemburg is done largely by mmercial agreements with the various porting countries. The union has thus de commercial agreements with Nor- y for the period February, 1947, to bruary, 1948; this covers, in addition iron and steel, the products of the chanical and electrical industries. A ilar agreement has been made with nmark. The already existing arrange- nts with France have been expanded d cover concrete reinforcing bars and el cables for Indo-China, locomotives d railroad freight cars for France and do-China, cranes for Indo-China, ships, uctural steel, zinc and zinc products. agreement with Czechoslovakia for 47 covers castings of iron and steel, d various nonferrous products. Negoti- ions are now on the way to arrive an agreement with Great Britain and rkey, and these will be followed by ks with Hungary, Portugal, Italy and itzerland.

British Iron, Steel Production Set Back by Power Curtailment

Output cannot improve unless fuel supplies, particularly coking coal, are increased. Shortages of railway cars cause backup of finished goods in producers' plants. Rerollers feel loss of semifinished imports

BRITISH iron and steel industry has a long way to go to recover from the setback experienced by the shutting off of electric power and also to severe weather conditions. Production dropped substantially in February. Average weekly pig iron output was 126,000 tons against 150,100 tons in the previous month and steel output was 206,300 tons, as compared with 239,800 tons.

The British Iron & Steel Federation comments that although these figures show a sharp reduction, they do not reflect the full decline as production was lower in the later than in the earlier weeks of the month. Production cannot be expected to improve unless fuel supplies, particularly of coking coal, are increased. The special importance of coking coal arises not only from the direct connection between coke supply and pig iron, but also from the need to maintain a proper gas balance in integrated works.

Nonessential Orders Eliminated

Owing to the congested state of order books, a determined effort is being made to eliminate the least important—though in these days every order that is accepted is urgently wanted. Deliveries are of course very much in arrears and with transport delays, particularly the shortage of railroad cars, finished goods are often standing in works for long periods before they can be moved.

Even before the current fuel crisis, Britain's coal deficiencies were a menace to the iron and steel industry, and for this reason the conversion to oil firing is being pushed ahead, but this will take time. Early this year the Federation announced a target output for 1947 of between 13 and 13.5 million tons of ingots, compared with 12,690,000 tons last year. That goal made allowances for possible fuel crises but it did not allow for further coal reduction which appears imminent. Neither did it allow for the complete cutting off of electrical power on which so many firms depend.

Exports are held up owing to transport difficulties and as most works have little room to stock finished steel a bottleneck develops. Exports during the next few months likely will have to be curtailed further so as to give users in the domestic market every chance of making up losses of the past winter. A vast amount of steel is wanted for steel houses, housing being priority No. 1 in Britain today and as housing was virtually at a standstill for two months owing to frost and snow it is more than likely that pressure for supplies in the near future will be great. The same conditions apply to the foundry trade. Foundrymen making light castings are inundated with orders for products needed for housing, but labor, fuel and transport are short.

As far as imports of semifinished steel are concerned the present arrivals are comparatively small and certainly not enough to satisfy the needs of rerollers. Prior to the war a million tons of steel were imported, principally from Europe. There is little hope of bringing imports to that scale during the present year.

Two important developments which should lead to a considerable extension of operations have been announced by F. H. Lloyd & Co., steel founders. One is the acquisition of the share capital of Parker Foundry (1929) Ltd., a concern mainly engaged in the manufacture of steel castings for the electrical, general engineering and shipbuilding industries. The second event is the purchase by the Ministry of Supply of a foundry which F. H. Lloyd had been operating as agent for the Ministry during the war period. Originally built as a steel foundry, its production is now largely devoted to high quality iron castings.

French Iron and Steel Prices Are Readjusted

French prices of iron and steel products have been readjusted to make up for cancellation of subsidies given to the metallurgical industry.

New prices are as follows:

	Bessemer Steel (per metric ton)	O. H. Steel (per metric ton)
Billets	$50.90	$54.58
Rails	82.33	
Beams	63.91	69.08
Bars	77.16	81.58
Wire rods	77.83	82.75
Plates over 5 mm	82.33	87.58
Plates, 2 to 5 mm	90.33	95.91
Sheets under 2 mm	99.66	105.125
Tin plate, per ton		236.50

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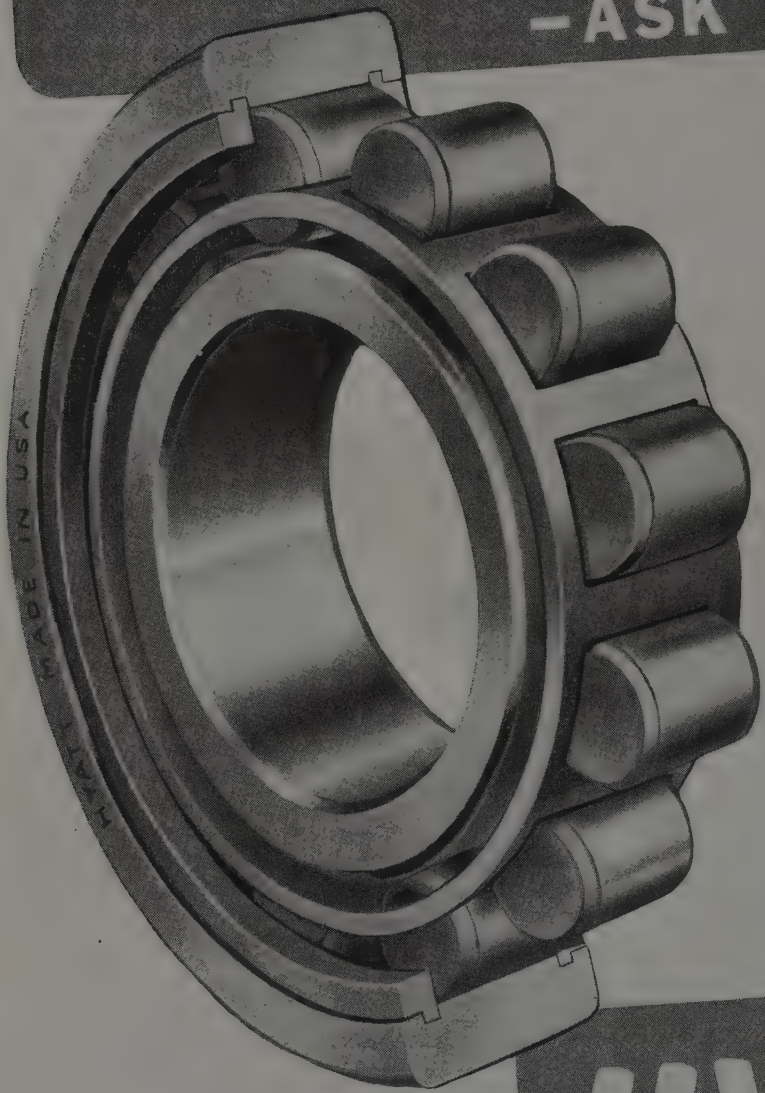

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HYATT ROLLER BEARINGS

By A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

High costs of tooling and plant reconstruction cut heavily into automotive companies' working capital. Many forced to seek additional funds. General Motors report shows expenditures of $357 million for tools and building

DETROIT

INROADS which high tooling costs and plant reconstruction have made on industrial working capital are exhibited strikingly in the General Motors annual financial report, a 52-page document issued March 27, two months in advance of the corporation's annual meeting. Had it not been for the sale of $223 million additional funds in the form of preferred stock and promissory notes, net working capital at the close of 1946 would have shown a 29 per cent decline in 12 months, or the equivalent of nearly $230 million. The explanation is that expenditures of $357 million for construction and special tools exceeded by $263 million the provisions which had been made for depreciation and amortization and charged to income. What portion of this enormous expenditure is accounted for by the cancellation of an extensive retooling program and subsequent scrapping of finished dies is not explained, but conceivably it could have been appreciable.

Others in Similar Position

Several other automotive companies have been compelled to seek additional working capital in the form of notes or revolving bank credits. Somewhat unusual was the action of Hudson Motor Car Co. in January to provide temporary additional reserve to cover costs of plant facilities improvements. An unsecured loan of $10 million was arranged with 12 banks, covering a period of three years, with $2 million repayable next January, $2 million a year after that, and the balance in January, 1950, interest rate being 1-3/4 per cent. An interesting provision of the short-term loan is the company's agreement not to permit consolidated net current assets (about $27 million at year-end) to go below $20 million and not to pay dividends aggregating in any calendar year an amount in excess of the consolidated net income for the previous year plus $75,000.

Net income of GM for the year was equivalent to $1.75 per common share, of which $1.36 represented the contribution of excess profits tax credits. This was bad news for the thousands normally participating in the corporation's bonus plan since terms of the plan call for a deduction of 7 per cent on net capital from net earnings before the set aside of 10 per cent of the balance for bonuses. This would have required the deduction of the equivalent of $1.94 per common share, or 18 cents more than was earned. Thus no bonus award will be made for 1946.

It was the first interruption in GM bonus awards in a long time. In past years the number of administrative personnel participating in bonuses has ranged from about 4000 in lean years and war years to better than 10,000 in the lush years. In 1940, for example, 10,411 received bonuses, including 224,598 shares of common stock and $342,212 in cash. Starting in 1943, the bonuses veered sharply in favor of cash rather than stock, the 1945 summary being 3809 participants, receiving $5,433,604 in cash and 74,621 shares of stock. Reason for the shifts probably was that the stock market rise of 1943-45 made GM common look less attractive than cash for bonuses, since many felt a washout in the stock market was a certainty.

The GM statement is prefaced by comment from Chairman Alfred P. Sloan Jr. under the title, "Importance of Management." Too long to reproduce in its entirety, it contains many cogent observations. Thus: "The perpetuation of an unusual success or the maintenance of an unusually high standard of leadership in any area of enterprise is often more difficult than the attainment of that success or leadership in the first place. Management must protect the business against dulling the spirit of venture by inertia of mind. . .

"The year under review was in many important ways the end of an economic era. The new era offers opportunity for accomplishment such as the passing one denied because of its political philosophy in regard to economic policy. . . . The decision to be made is whether or not the American economy over the long-term is to continue free and competitive or is to be regimented and directed by some form of governmental bureaucracy following socialistic trends in the balance of the world. Here is a real challenge to the managers of American enterprise."

How well GM plants snapped back after three months of idleness at the start of last year is seen from the fact total production for the year was 1,174,448 cars and trucks, 36 per cent of the industry total for the year. During the fourth quarter of the year, GM built 44 per cent of the industry's total, comparing favorably with the 46 per cent share it enjoyed in 1941. In terms of passenger cars alone, the corporation's fourth-quarter share was 47 per cent, comparing with 48 per cent for the year 1941.

Despite a factory operating loss of over $6.5 million, Packard added over $4.8 million to earned surplus. This seeming miracle was accomplished by the combined cushion of an estimated refund of $5.65 million in federal taxes on 1944 income, profit of over $2.5 million from operations of branches and sales subsidiaries and adjustment of $2.9 million in reserves set aside for wartime operations but no longer required. The company built 42,102 cars in 1946 or roughly 63 per cent of the 1941 total.

Automobile Production

Passenger Cars and Trucks—U. S. and Canada

Estimates by Ward's Automotive Reports

	1947	1946
January	373,872	126,082
February	399,082*	84,109
March	440,304*	140,738
April		248,108
May		247,620
June		216,637
July		331,000
August		859,111
September		342,969
October		410,510
November		380,664
December		380,908
12 ms.		3,268,456

* *Preliminary.*

Estimates for week ended:

Mar. 15	105,496	35,020
Mar. 22	108,472	37,285
Mar. 29	100,261	43,070
April 5	110,000	47,735

Ford Offers "Spring Models"

Ford popped a surprise announcement last week indicating a new series of "spring-model" cars would shortly be displayed by dealers, incorporating a number of styling changes, both inside and outside, as well as ten new colors. Simultaneously the resumption of production of a three-passenger 6-cylinder business coupe was disclosed, plus a $20 cut in its price. Presumably one aim of this step was to offer a model which

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1948 PACKARD: Modifications of the traditional Packard lines are illustrated in this photo of the new Packard 1948 convertible. The new model is slated for quantity production in June

would undersell the lowest-price Chevrolet, until now making the least expensive standard type passenger car.

Styling changes on the Ford line include relocation of parking lights, new medallion in place of a hood ornament, heavier bumper guards, lower fender moldings, rub molding strips extending the full length along the bottom of front fenders, wider stainless steel belt molding, heavier door handles and new chrome-plated deck lid ornament replacing moldings. Interiors boast restyled door panels in heavier artificial leather and fabric center panels, as well as new gold and gray screen textured dials on instrument panels.

Ford sales officials say their dealer order backlog still exceeds 12 million, or 62 per cent more than the total a year ago. Not over 20 per cent of these orders are believed to be duplications, leaving 1,200,000. Ford production is holding close to 4000 units daily, not counting Mercury or Lincoln.

Foundry Technique Revised

Revision in crankshaft molding techniques in the Ford foundry is claimed to result in savings in manufacturing costs and stronger shafts. The system utilizes the cooling or chilling capacity of the conveyor hangers on which the shafts are poured in groups of four. Formerly small cylindrical inserts of chills were used in each mold, suspended near the bottom of the mold. These inserts became integral parts of the crankshaft and fusing was not always complete. With the new method the hangers serving as bases for the vertical molds act as chills and promote progressive cooling of the metal from the bottom upward. In addition to other benefits, the present system had reduced drill breakage by approximately 75 per cent. High breakage formerly was encountered due to the necessity for penetrating the softer chill insert when drilling oil holes through the No. 1 crankshaft and crankpin bearings.

Ask Bumper Standardization

Recommendations by the Society of Automotive Engineers leading to a standardization of bumper heights on all automobile, station wagon and light truck models—no "dive" below or rise above 18.25 in. on a normal stop— have been approved by the Automotive Manufacturers Association and shortly should be adopted by all individual manufacturers. The standardization eventually should go far toward solving problems of locked bumpers resulting from different heights.

Also in the field of bumpers, designers are working toward pulling them in several inches, both front and rear, with the idea of easing the problem of parking new models which in recent years have been steadily jutting out more front and rear from the wheelbase. The problem is not too complicated, involving the moving of the bumper section back against the body itself and shortening the support brackets, as well as eliminating splash shield. Rough calculations show it may be possible to cut 8 to 10 in. from overall length of many models by this relocation of bumpers.

Eventually, it appears almost certain, bumpers will have to be extended all the way around cars, particularly in view of the trend toward adding to body width inside by moving doors outward until they are flush with the fender line. Many watch this coming development with dismay, wondering how it will ever be possible to park cars side by side as in parking lots and get out of them successfully. Already the extreme width of doors on two-door models, plus extra wide bodies, is making close parking difficult if not impossible.

Open Lake Shipping Season

The *Henry Ford II* was scheduled to leave last Tuesday from the Rouge slip for Roger City, Mich., to pick up a cargo of limestone for the Rouge plant, marking the earliest departure of a Ford boat in many years. On Apr. 15, the freighter and its sister ship, the *Benson Ford*, will start on ore-carrying trips between Duluth, Minn., and the Rouge, if ice conditions permit. Word from the upper lakes is that the outlook is none too favorable. The two Ford boats, among the few to remain in the sharply trimmed company fleet, are the largest diesel-powered ore carriers on the Great Lakes, each with capacity of 15,000 tons of ore.

Moekle Leaves Ford

One of the last of the old-guard managers on the Ford staff, Herman L. Moekle, vice president in charge of finance and a director, resigned last week. He joined the company in 1913 in accounting work at Pittsburgh, came to Dearborn in 1918, was named auditor in 1927 and assistant secretary in 1941. Two years later he became secretary and assistant treasurer, and a year ago was appointed vice president.

Expands Mexican Plant

Completion of a 55 per cent expansion in the manufacturing area of the Chrysler assembly plant, Fabricas Auto-Mex, at Mexico City, was celebrated recently. The plant, started in 1938, was built with Mexican capital and is staffed by Mexican labor, Chrysler furnishing stocks of parts and subassemblies for cars and trucks. Main plant area is 838 ft long and 243 ft wide. Modernization program, undertaken since the war, included lengthening of the frame line, installation of new painting system, conveyor system and unloading docks.

Gaston Azcarraga, president, was host to Chrysler officials at the three-day opening ceremonies.

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Here is a new sheet, made exclusively by Continental, which provides added strength, toughness and greater resistance to rust. Made to a patented analysis, KONIK combines quality open hearth steel with copper, nickel and chromium to produce one of the finest, most enduring and most economical steels you can buy. KONIK works readily, stands extreme forming operations, and machines well. Write for special, descriptive folder.

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For sheet steel products requiring paint or enamels, specify Continental GALVANNEALED. This highly rust-resistant zinc-coated sheet has a matte-like surface which "takes" and "holds" fine finishes without the need of costly preparatory treatments. Its high degree of workability saves time, encourages good workmanship.

DULL-COAT

Like GALVANNEALED, Continental's DULL-COAT sheet also has a good surface which provides a tight bond for paints, enamels, and lacquers. It works easily, and is uniform in quality.

COPPER STEEL

To put longer life into your products . . . to provide extra resistance to rust and corrosion, use Continental COPPER STEEL. This sheet is made of special analysis copper steel. It is uniform in temper . . . noted for its workability and long life.

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This sheet is made especially for electrical equipment manufacture. Its uniformity of temper makes it suitable for most requirements in this application.

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ALSO, Manufacturer's Wire in many sizes, shapes, tempers, and finishes, Continental Chain Link Fence, Nails, and other steel products.

Lone Star Steel Takes Five-Year Lease on Plant

Terms include option to purchase furnace at Daingerfield, Tex., and mines at McAlester, Okla., for $7,500,000

LONE Star Steel Co. of Dallas, Tex., has taken a five-year lease on the blast furnace at Daingerfield, Tex., and the coal mines at McAlester, Okla., with an option to buy the properties any time during the first year of the lease from War Assets Administration for $7,500,000.

Lone Star will pay as rental $2 a ton for the pig iron produced, with a minimum rental of $70,000 per quarter. The Dallas company will supply $3 million for operating expenses, half of which will be obtained from an RFC loan and half from the company's treasury and sale of stocks. If Lone Star exercises its option to purchase, it agrees to pay $1 million down and the remainder in 10 equal annual installments.

Also included in the agreement is the stipulation that Sheffield Steel Co. of Houston will receive one half of the coal production at McAlester for the duration of the pig iron shortage. Sheffield had originally filed a bid for this property which was rejected.

Capacity of the blast furnace is 450,000 tons of pig iron a year plus by-products of coke, ammonium sulphate, tar and special oils. The facilities, which include 78 coke ovens in addition to the 700-ton furnace and the mines, were built or developed during the war by the government at a cost of $30 million.

Executives of Lone Star report they have "firm orders" at this time for 415,000 gross tons of pig iron and have under negotiation prospective orders for 923,000 gross tons, a total which is more than three times the furnace's capacity for the next year. The company plans to begin pig iron production within the next 60 days and coke production within the next 30 days.

United Reports Increasing Backlog of 1947 Business

United Engineering & Foundry Co., Pittsburgh, states in its annual report that there is a "constantly increasing backlog of business which is sufficient to provide better than normal operation through the coming year."

F. C. Biggert Jr., chairman of the board, and K. C. Gardner Sr., president, said "plants have been steadily expanding production" after a 1946 period when "the confusion incident to the shift from war production to that of a peacetime economy had a pronounced effect on the financial results of the company."

Net earnings for 1946 were $1,723,151 compared with $2,341,861 for 1945. The 1946 figure includes a $1,165,000 refund of federal excess profit taxes and $465,794 in nonrecurring items of income. Net sales for 1946 were $24,195,150, compared with $41,545,310 in the preceding year.

SEATRAIN LOADER: Ship's eye-view of the new overhead loading structure for seatrains at terminal at Edgewater, N. J., recently erected by American Bridge Co. Two overhead traveling cranes will lift loaded freight cars onto ships berthed at concrete pier in foreground

Underwing Fueling Device Shown by Parker Appliance

To speed aircraft fueling operations and eliminate most of the dangers associated with handling of high-octane gasoline, Parker Appliance Co., Cleveland, has developed an underwing fueling device for aircraft. The mechanism, consisting of two parts, a nozzle component and a tank component, makes possible delivery into the plane 200 gal of gas per minute, as compared with 50 to 75 gal per minute using conventional fueling methods which consist simply of pouring gasoline into the top of the tank in much the same manner as an automobile is gassed.

Parker's development, which was demonstrated at a recent meeting of the company's salesmen in Cleveland, eliminates the hazards of fueling from the top of the wing. By locating part of the mechanism in the bottom of the wing fuel tanks, all fueling is done from the ground and the dangerous and time-consuming operations of climbing a ladder placed against the wing, dragging a heavy fuel hose over the wing surface, and opening the gas tank are avoided.

Already installed in Glenn L. Martin Co.'s new transport planes, the 202 and the 303, the underwing fueling device is being studied carefully by the Army and Navy, which are interested in fueling planes in a minimum of time with a maximum of safety for personnel and equipment. The Navy, too, is particularly interested in a feature of the mechanism which permits rapid defueling of planes. Because planes based on aircraft carriers must be voided of gasoline before being stored below decks and are fueled at the last possible minute before takeoff, the new device is attracting much attention.

Detrola Buys Blast Furnace Facility from Wheeling Steel

International Detrola Corp., Detroit, has purchased the blast furnace property of Wheeling Steel Corp. at Martins Ferry, O., C. Russell Feldmann, Detrola president, announced last week.

"This addition is a step to assure our Newport, Ky., open hearth and rolling mill operations an annual supply of some 150,000 tons of pig iron," Mr. Feldmann said. Detrola last August acquired the Newport steel plants of Andrews Steel Co., in addition to a coal mine owned by Andrews, in order to supplement Detrola's manufacturing activities in refrigeration, radio, aircraft and other fields.

BRIEFS . . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

Westinghouse Electric Corp., Pittsburgh, reports its Appliance Division did a dollar volume of business in January and February of this year that was 20 per cent greater than in any two-month period of consumer production in the company's history.

—o—

BMC Mfg. Corp., Binghamton, N. Y., announces price reductions ranging from 10 to 15 per cent have been put into effect on its line of pressure lock wrenches.

—o—

American Brake Shoe Co., New York, has opened a sales office at 1500 Walnut St., Philadelphia, which will be occupied by its Electro-Alloys Division, National Bearing Metals Division, Brake Shoe & Castings Division and Kellogg Division.

—o—

Union Asbestos & Rubber Co., Chicago, has acquired all the capital stock of Carolina Asbestos Co. Inc., Davidson, N. C. Operation of the Carolina company will continue under the direction of the present management with C. H. Carlough as president and T. S. Sadler as vice president.

—o—

Ingalls Shipbuilding Corp., Pascagoula, Miss., has launched the *Del Sud,* second of three 17,000-ton luxury passenger-cargo liners constructed for Mississippi Shipping Co.

—o—

Wall Colmonoy Corp., Detroit, manufacturer of welding alloys and equipment, has named the following distributors: L. J. Okelberry, Murtaugh, Idaho, for Idaho; Middlesex Welding Supply Co., New Brunswick, N. J., for central New Jersey; Essex Welding Equipment Co., Newark, N. J., for northern New Jersey.

—o—

Anbar Inc., Chicago, brass and aluminum foundry formerly owned by Protectoseal Co., Chicago, has been purchased by John Monaco, and is now being operated under the name of Anbar Foundry.

—o—

Southern States Iron Roofing Co., Savannah, Ga., manufacturer of steel and aluminum products for the building industry, reports 1946 sales of over $12,500,000 with profits before taxes of $1,194,000. This was the best record in the 31-year history of the company.

—o—

Babcock & Wilcox Co., New York, has purchased from the government for $55,000 a steam plant adjacent to its Beaver Falls, Pa., steel facility. A two-story structure containing 2400 sq ft of floor space, the building with equipment orginally cost $163,484. The company plans to re-equip it and install a central steam plant.

—o—

North American Philips Co. Inc., New York, will conduct its course in x-ray diffraction and spectrometry from April 21 to 25 at its offices at 100 E. 42nd St. Admission is free to owners of Philips equipment.

—o—

Hammond Iron Works, Warren, Pa., fabricator of petroleum and chemical tanks, has acquired facilities at Port Neches, Tex. The plant was built and operated during the war by Rubber Reserve.

—o—

Carter Mfg. Co., Birmingham, maker of truck trailers, has been sold to Fruehauf Trailer Co., Detroit, and will become Fruehauf Carter Division. There will be no change in management.

—o—

Barcaol Mfg. Co., Buffalo, maker of small tools and other metal products, has acquired Chandler Industries Inc., Buffalo.

—o—

Sherman M. Fairchild & Associates, New York, has been newly formed to provide a service in business analysis.

—o—

Federal Products Corp., Providence, R. I., has completed a three-story addition to its main plant and is now increasing its production of precision measuring instruments.

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B. F. Goodrich Co., Akron, announces that its $11 million plant at Tuscaloosa, Ala., is approaching its capacity production of 6000 tires and tubes daily.

—o—

Dampney Co. of America, Boston, has appointed Combustion Equipment & Insulation Co., Cleveland, as agent in the Cleveland area for its line of protective coatings for metal surfaces.

—o—

Formica Insulation Co., Cincinnati, manufacturer of laminated materials, has named George J. Haas Co., Miami, Fla., as sales representative for the Miami area.

—o—

Turner Construction Co., New York, built 2,656,850 sq ft of floor space in 1946, carrying on activities in 20 cities throughout the United States.

—o—

Diagraph-Bradley Stencil Machine Corp., St. Louis, manufacturer of stencil machines and shipping room supplies, has opened an office in Philadelphia at 629 N. 19th St.

—o—

Atlas Imperial Diesel Engine Co., San Francisco, has acquired from Continental Can Co. its can-making plant at Fullerton, Calif., for about $750,000. Purchase marks the Atlas company's entrance into the can business.

—o—

Geneva Steel Co., Geneva, Utah, has been awarded a $230,000 contract for rolling plates to be fabricated into heavy duty pipe for construction of American-Arabian oil line. Delivery of the plates will be started about June 1.

—o—

Torrington Mfg. Co., Torrington, Conn., maker of mill equipment for the nonferrous metal industry, springmaking machinery and fan propeller blades, was erroneously referred to in our Mar. 31 issue as establishing a subsidiary in Westfield, N. Y., for the production of machine needles.

—o—

Pittsburgh Lectromelt Furnace Corp., Pittsburgh, has made arrangements with Stein et Roubaix, Paris, France, for manufacture of its furnaces in France. Associates of Stein et Roubaix in Belgium will manufacture the products for Belgium and its colonies. Arrangements have also been concluded with General Electrica Esanola, Bilboa, Spain, for Spanish manufacture.

—o—

Leslie Co., Lyndhurst, N. J., manufacturer of regulators, controllers and whistles, announces the appointment of the following sales and service agents: Claude B. Smith, San Francisco; Joseph Tripoli, Buffalo; Riley Power Equipment Co., Milwaukee; and Stem & Heider, Rochester, N. Y.

—o—

General Electric Co., Schenectady, N. Y., announces that shipment of the first 100 million-electro-volt atom smasher to be built on a commercial basis is under way.

—o—

Cleveland Pneumatic Tool Co., Cleveland, has sold its pneumatic tool division to Reed Roller Bit Co., Houston, Tex., manufacturer of oil well and rock-drilling machinery, for about $1,500,000. The Ohio firm will continue production of aircraft landing struts at its Cleveland plant.

—o—

Tracy & Potts, foundry pricing advisers, recently organized by John I. Tracy, OPA foundry price specialist for several years, and William B. Potts, OPA accountant, have offices at 1117 Citizens Bldg., Cleveland.

The Business Trend

Bad Weather Cuts Rate Of Industrial Activity

AFTER a six-weeks upward movement climaxed with a new postwar high, industrial activity as registered by STEEL's industrial production index dipped 4 points in the week ended Mar. 29 as a result of the recent blizzard.

This put the index down to 160 per cent of the 1936-1939 average, and in view of the week's inactivity begun Apr. 1 by the coal miners it is unlikely that any substantial recovery can be made in the industrial pace in the week ended Apr. 5.

AUTOS—One of the industries hit hard by the blizzard was that of the automobile manufacturers. From a postwar high of 108,472 units in the week ended Mar. 22, production fell to an estimated 100,261 passenger cars, trucks and busses in the week ended Mar. 29. Aside from the immediate harm done by the bad weather, it is feared that supply plants idled by the blizzard will be unable to deliver full quotas for April's car-making schedules.

STEEL—Despite the handicaps thrust onto some industries by the blizzard, steel producers were able to continue ingot production at a pace sufficiently high to set a new peacetime record in the week ended Mar. 29. Demand for steel continues unabated, with flat-rolled products under greatest pressure.

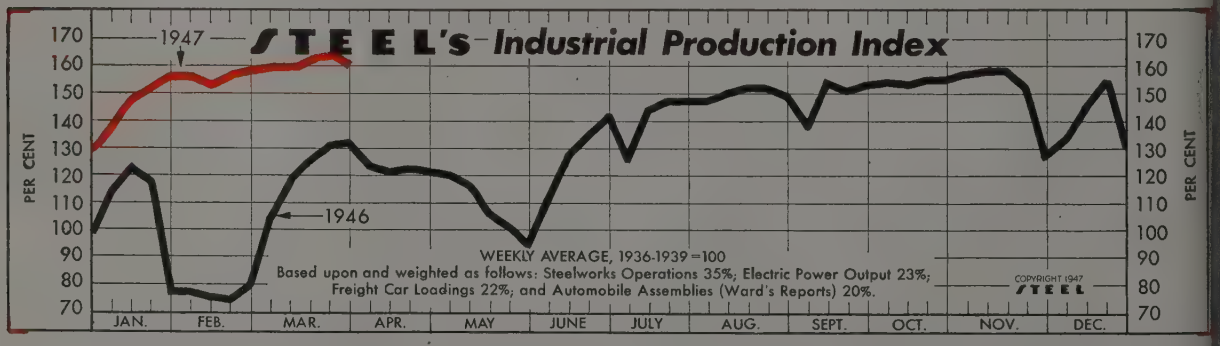
COAL—Declining slightly, bituminous coal output in the week ended Mar. 22 was estimated at 12,880,000 net tons, compared with 13,150,000 in the preceding week. Production this year through Mar. 22 was 1.1 per cent ahead of that for the corresponding period of last year.

PRICES—Average wholesale prices rose 0.5 per cent in the week ended Mar. 22 after a slight decline in the preceding week. Although agricultural commodities declined, prices of nonagricultural commodities continued their steady advance, with a result the U. S. Bureau of Labor Statistics wholesale price index in the week ended Mar. 22 reached 149 per cent of the 1926 average.

PRODUCTION INDEX—Industrial output, as measured by the Federal Reserve Board's seasonally adjusted index, was maintained in February at January's postwar peak rate of 188 per cent of the 1935-1939 average. Durable goods manufacturing gained slightly in February over January, but output of nondurables fell moderately.

FACTORY EARNINGS—For the third successive month, average weekly earnings of production workers in manufacturing industries remained in February at the $47 level, according to preliminary estimates of the U. S. Bureau of Labor Statistics. The continued uptrend of hourly earnings more than offset the decline in the work-week.

INVENTORIES—Extreme caution in management of inventories is noticeable, with many companies maintaining supplies only to the extent of definitely scheduled production, the National Association of Purchasing Agents reports. Some new unbalancing of stocks is reported due to railroad freight car shortages, but overall, inventories in the last few months have been reduced considerably and become better balanced.



The Index (see chart above): Latest Week (preliminary) 160 Previous Week 164 Month Ago 160 Year Ago 132

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)†	97.0	96.5	92.5	89.5
Electric Power Distributed (million kilowatt hours)	4,729	4,759	4,797	3,992
Bituminous Coal Production (daily av.—1000 tons)	2,147	2,191	2,172	2,218
Petroleum Production (daily av.—1000 bbls.)	4,865	4,862	4,771	4,424
Construction Volume (ENR—Unit $1,000,000)	$60.1	$109.1	$91.7	$134.9
Automobile and Truck Output (Ward's—number units)	100,261	108,472	105,175	37,285

* Dates on request. † 1947 weekly capacity is 1,749,928 net tons. 1946 weekly capacity was 1,762,381 net tons.

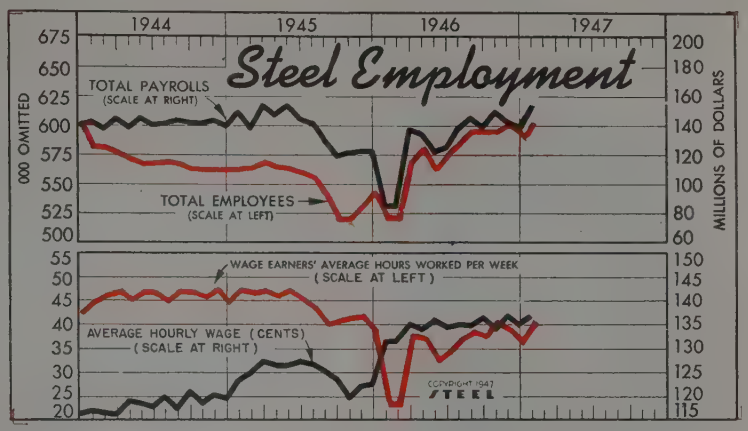
TRADE				
Freight Carloadings (unit—1000 cars)	815†	844	850	809
Business Failures (Dun & Bradstreet, number)	63	47	74	18
Money in Circulation (in millions of dollars)‡	$28,170	$28,242	$28,262	$27,842
Department Store Sales (change from like wk. a yr. ago)‡	+12%	+10%	+2%	+12

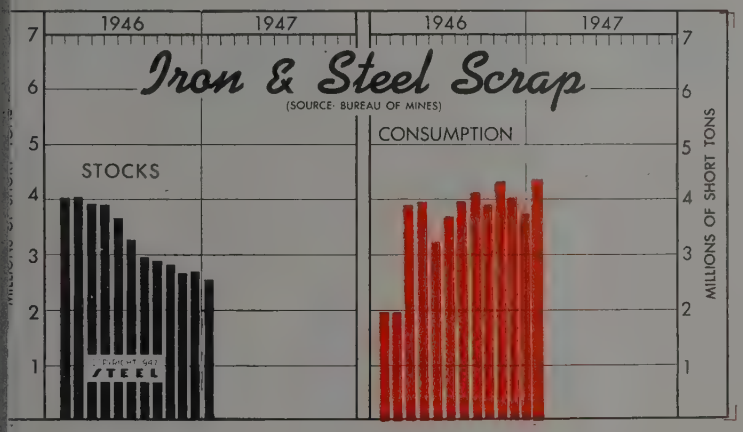
† Preliminary. ‡ Federal Reserve Board.

Steel Employment

	Employees† (000)		Total Payrolls (millions)		Hourly Wage† (cents)	
	1947	1946	1947	1946	1947	1946
n.*	601	522	$155.8	$84.9	137.4	131.4
b.*	...	522	....	84.9	....	131.4
ar.	...	570	....	138.8	....	135.1
ril	...	582	....	134.3	....	134.1
y	...	563	....	121.4	....	135.8
ne	...	578	....	125.6	....	134.4
y	...	585	....	138.0	....	135.1
g.	...	596	....	145.2	....	134.6
pt.	...	596	....	139.6	....	136.2
t.	...	596	....	150.6	....	134.1
v.	...	600	....	143.4	....	136.7
c.	...	594	....	137.2	....	135.2

† Monthly average. * Figures for January and bruary, 1946, are merely averages derived m a report that combined those two strike-ected months.





Iron and Steel Scrap

Bureau of Mines

(Gross Tons—000 omitted)

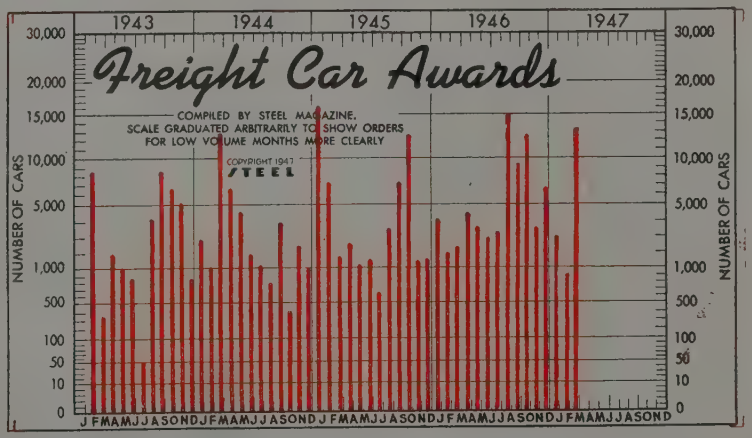
	Consumers' Stocks			Total Consumption		
	1947	1946	1945	1947	1946	1945
Jan.	2,577	†	5,023	4,375	*2,026	4,507
Feb.	....	4,010	4,901	....	*2,026	4,209
Mar.	....	4,031	4,873	....	3,942	4,889
Apr.	....	3,933	4,907	....	4,021	4,668
May	....	3,911	4,902	....	3,270	4,774
June	....	3,670	4,847	....	3,763	4,414
July	....	3,268	4,762	....	3,997	4,184
Aug.	....	2,968	4,848	....	4,170	3,562
Sept.	....	2,909	4,708	....	3,973	3,567
Oct.	....	2,824	3,527	....	4,381	3,867
Nov.	....	2,671	3,520	....	4,088	3,909
Dec.	....	2,709	3,341	....	3,785	3,687

† Data not available. * Figures for January and February, 1946, are merely averages derived from a report that combined these two strike-affected months.

Freight Car Awards

	*1947	*1946	1945	1944	1943
n.	9,905	1,500	7,200	1,020	8,365
b.	13,727	2,403	1,750	13,240	350
ar.	....	4,512	2,500	6,510	1,935
or.	....	3,764	1,120	4,519	1,000
ay	....	3,025	1,526	1,952	870
ne	....	3,335	670	1,150	50
ly	....	14,836	3,500	795	4,190
g.	....	9,629	7,240	3,900	8,747
pt.	....	12,768	12,840	400	6,820
t.	....	3,407	1,320	2,425	5,258
v.	....	6,707	1,650	1,065	870
c.	....	3,041	4,116	16,245	2,919
tal	....	68,927	45,432	53,221	41,374

* American Railway Car Institute.


1943
1944
1945
1946
1947
Freight Car Awards
COMPILED BY STEEL MAGAZINE.
SCALE GRADUATED ARBITRARILY TO SHOW ORDERS
FOR LOW VOLUME MONTHS MORE CLEARLY
COPYRIGHT 1947
STEEL
NUMBER OF CARS
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D

FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$12,904	$13,914	$11,370	$11,801
Federal Gross Debt (billions)	$259.2	$258.9	$261.5	$276.5
Bond Volume, NYSE (millions)	$17.6	$16.7	$18.3	$25.7
Stocks Sales, NYSE (thousands)	4,448	3,739	5,377	6,804
Loans and Investments (billions)†	$55.5	$55.6	$55.1	$66.3
United States Gov't. Obligations Held (millions)†	$35,258	$35,300	$34,949	$47,458

† Member banks, Federal Reserve System.

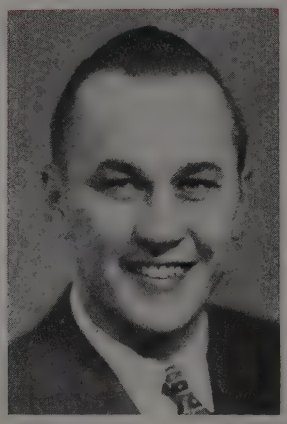
PRICES

STEEL's composite finished steel price average	$69.82	$69.82	$69.73	$63.54
All Commodities†	149.0	148.3	144.3	108.4
Industrial Raw Materials†	164.3	164.1	156.2	120.9
Manufactured Products†	143.1	142.1	140.0	104.3

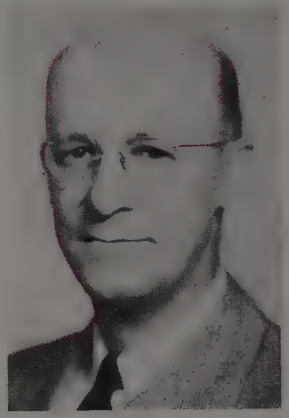
† Bureau of Labor Statistics Index, 1926=100.

Men of Industry

ROY V. THOMAS



C. R. HARMON



STOWELL C. WASSON

Roy V. Thomas has been appointed personnel manager, Ohio Crankshaft Co., Cleveland. He had formerly been associated with the Brewing Corp. of America, and Telling Belle Vernon Co., Cleveland.

—o—

H. L. Stiles, Chicago Electric Mfg. Co., Chicago, has been appointed chief engineer, and **Frank P. Rodwick,** production engineer of the company.

—o—

John C. Vender Pyle, executive vice president, American Machine & Metals Inc., New York, has been elected president. He succeeds **P. G. Mumford,** who continues as chairman of the board. **Charles W. Anderson** has been named executive vice president, and **P. S. Mumford,** general manager of the East Moline, Ill. factory, has been elected a vice president.

—o—

Allen W. Jacobson has been appointed general superintendent of Boeing Aircraft Co., Seattle, to succeed **C. M. Weaver,** who has resigned. **Fred P. Laudau** has succeeded Mr. Jacobson as manager of the company's experimental shops.

—o—

Merrill Head has been named secretary, general attorney, and a director of Geneva Steel Co., subsidiary of U. S. Steel Corp. He succeeds **Merrill Russell,** who recently was made general attorney of U. S. Steel Corp., at Pittsburgh.

—o—

Gerald B. Payne has been elected president of United Gilsonite Laboratories, Scranton, Pa.

—o—

Waldemar Naujoks has been elected president of the Bison Forge Co. Inc., Buffalo. He is associated as partner with **David L. George,** also a forging engineer. Bison Forge Co., in addition to producing all general types of flat die and hammered forgings, will specialize in ring and shape forgings in alloy, aircraft, and stainless metals.

—o—

C. R. Harmon has been appointed Pittsburgh sales manager, Firth Sterling Steel & Carbide Corp., McKeesport, Pa. He was formerly sales manager for Penn Carbide & Alloy Casting Co., and was previously associated with Jessop Steel Co., and Crucible Steel Co. of America.

—o—

George L. Sook Jr. has been appointed superintendent of the new Niles, O., plant of the American Brake Shoe Co. Operations in this plant will begin about July 1.

—o—

Arno G. Desens, general manager, Eagle Mfg. Co., Appleton, Wis., has been named president of the board of directors of the company, to succeed the late **Charles Hagen.**

—o—

H. M. Hammond, former general sales manager, Bailey Meter Co., Cleveland, has been promoted to vice president of the company. **P. S. Dickey,** former chief engineer, has also been named a vice president.

—o—

Moxie S. George has been appointed New York district sales manager for Inland Steel Co., Chicago. He has been assistant manager of sales in the Tin Plate & Export Division at Inland's general offices, Chicago, since 1938. He succeeds **Powell Pardee,** who will continue to serve in the New York office as special representative.

—o—

E. W. Bernitt, plant engineer, Kenosha, Wis., plant of Nash-Kelvinator Corp., Detroit, has been appointed staff engineer to **R. A. DeVlieg,** vice president in charge of manufacturing. **J. J. Mueller** has been appointed plant engineer, to succeed him.

—o—

Stowell C. Wasson, National Malleable & Steel Castings Co., manager of the company's works at Cicero and Melrose Park, Ill., has been elected a director of the company. He succeeds the late **Charles H. McCrea.** Mr. Wasson became associated with National Malleable in 1911, and has spent his entire business career with the company.

—o—

Edwin P. Corey has resigned as general manager of tubular sales, Youngstown Sheet & Tube Co., Youngstown. He joined the company in 1923, and had previously held various positions with the National Tube Co., with which he became associated in 1895.

—o—

J. F. Berger has been appointed assistant sales manager, Woven Wire Fabrics Division, John A. Roebling's Sons Co., Trenton, N. J. He has been associated with the company for 37 years, and has had long experience with the company as a salesman and field engineer for the division.

—o—

W. J. Eberlein has been elected a vice president in charge of sales, Greenfield Tap & Die Corp., Greenfield, Mass. He has been associated with the company for over 30 years.

—o—

Joe McCarthy has been elected president of the Midwest Metals Corp., a new firm formed in Davenport, Iowa, to distribute rolled and drawn metal products, and to fabricate steel. **A. Linton Lundy Jr.,** former manager of industrial sales, Bettendorf Co., Bettendorf, Iowa, has been named vice presi

HIGH SPEED PLATING

with GENERAL CHEMICAL

ZINC FLUOBORATE

SPEED UP... CUT COSTS WITH THIS "CHEMICAL OF TOMORROW"

Introduced by General Chemical Research less than a year ago, Zinc Fluoborate Solution has already proved an outstanding electroplating chemical. Its superiority to other commercial zinc baths is indicated both in high speed continuous operations and by unusual coverage in tank plating. It gives excellent adherence and uniform coverage as well as a semi-lustrous finish; also possesses high conductivity and permits the use of high current densities. For detailed information on the use of Zinc Fluoborate—

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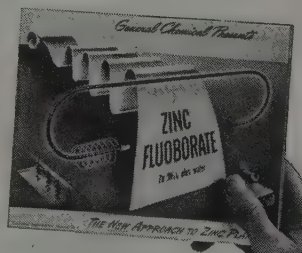
General Chemical Technical Information Manual ZF-1 contains extensive data on high speed and tank and barrel plating with Zinc Fluoborate, including operating details, bath make-up, analytical methods, etc. For free copy, write General Chemical Fluorine Division, 40 Rector Street, New York 6, N. Y. or nearest Sales and Technical Service Office.



HIGH-SPEED PLATING

Zinc may be readily deposited at a higher rate from the Zinc Fluoborate bath than from other acid baths, for this metal fluoborate electrolyte possesses high conductivity and permits the use of high current densities.

TANK AND BARREL PLATING

Zinc may be readily deposited on cast or malleable iron from the Zinc Fluoborate bath with excellent covering power, good adhesion, and with a semi-lustrous appearance.

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Sales and Technical Service Offices: Albany • Atlanta • Baltimore • Birmingham Boston • Bridgeport • Buffalo • Charlotte • Chicago • Cleveland • Denver Detroit • Houston • Kansas City • Los Angeles • Minneapolis • New York Philadelphia • Pittsburgh • Providence • San Francisco • Seattle • St. Louis Wenatchee & Yakima (Wash.)

In Wisconsin: General Chemical Wisconsin Corporation, Milwaukee, Wis.

In Canada: The Nichols Chemical Company, Limited • Montreal • Toronto • Vancouver

BASIC CHEMICALS
GENERAL CHEMICAL COMPANY
FOR AMERICAN INDUSTRY

dent and general manager. Before the war he had been associated with Columbia Steel Co. for 17 years. He served four years in the Navy as head of raw materials section of the Bureau of Ships.

—o—

David Bristol has been appointed manager of the Chicago district office, recently opened by O. K. Tool Co. Inc., Shelton, Conn. He was formerly in the Shelton office as chief tool designer. Two sales representatives appointed in the Chicago office are **Eugene Scovil,** sales representative for southern Chicago and northern Indiana, and **Frank Gaynor,** who will be in charge of Iowa and southern Illinois. Two additional centers of distribution for this district will be: Rickert Industrial Supply (successors to Camm-Blades), for Milwaukee; and Martin & Prestegaard Co. for Minneapolis.

—o—

John S. Seltzer, recently associated with the Coil Engineering & Mfg. Co., Roanoke, Ind., has joined the Lintern Corp., Berea, O. He has been named general manager in charge of purchases, material control, and production. Mr. Seltzer had previously been connected with Westinghouse Electric Corp. at the Cleveland plant, as manager of purchases and stores, and had been associated with that company for 23 years.

—o—

Barney N. Dagan has been appointed assistant open hearth superintendent, Iron & Steel Division, Kaiser Co., Fontana, Calif., to succeed **G. W. Conn,** who recently resigned to join the Ford Motor Co. Mr. Dagan has been assistant to the open hearth superintendent. He had previously been associated with the Youngstown Sheet & Tube Co. **Clarence R. Lohrey** has been appointed assistant superintendent of the coke and by-products department. He had formerly been Coke Plant superintendent, Republic Steel Corp., Cleveland.

—o—

William T. Faricy, vice president and general counsel, Chicago & North Western Railroad, has been elected president of the Association of American Railroads. He succeeds **R. V. Fletcher,** who has served since the death of **J. J. Pelley,** in 1946, and who will continue as special counsel for the association.

—o—

Jacque Brown, at one time associated with the Delco Appliance Division of General Motors Corp., Detroit, has been appointed assistant sales manager, Heating & Water System Division, Heil Co., Milwaukee.

—o—

F. E. Elge, founder and developer of Trent Tube Mfg. Co., East Troy, Wis., has resigned as president to become executive vice president of the company. He also will continue as director. Mr. Elge has been succeeded as president by **Walter H. Wiewel.**

—o—

William N. Neal, vice president and treasurer, Sloss-Sheffield Steel & Iron Co., Birmingham, has been appointed a state director of the National Association of Manufacturers. He succeeds **Warren Whitney,** Birmingham, who recently was made regional vice president.

—o—

Glenn W. Green has been appointed Chicago sales representative for the Columbia Chemical Division, Pittsburgh Plate Glass Co., Pittsburgh.

—o—

Lawrence W. Guild has been appointed manager of the New England district, recently organized by Kennametal Inc., Latrobe, Pa. This district comprises territories covered by the Kennametal Hartford, Springfield, and Boston offices. Mr. Guild has served Kennametal Inc. for several years as a representative and tool engineer. His headquarters will be at the Springfield, Mass., office, 1537 Main Street.

—o—

Paul H. Holton has been appointed manager of the Atlantic district office, 1060 Broad Street, Newark, N. J., Carboloy Co. Inc., Detroit. He has been a sales engineer in the Philadelphia area of the company since 1937. In his new position, he succeeds **T. D. MacLafferty** who has resigned. **Paul Schick,** recently attached to the Carboloy training course at the company's plant in Detroit, has been named to succeed Mr. Holton at Philadelphia.

—o—

Ernest E. Olds has been appointed general sales manager, Size Control Co., Chicago, division of American Gage & Machine Co., Chicago. He was formerly district sales manager, and had previously been associated with Remington Rand Inc., Buffalo.

—o—

James F. Newton has been named manufacturing manager of Link Aviation Inc., Binghamton, N. Y. He joined the company in 1945, and was formerly associated with Consolidated Vultee Aircraft Corp., San Diego, Calif.

—o—

Richard L. Jackson and **Fred S. Middleton** have been named vice presidents of Jackson Industries Inc., Birmingham. Mr. Jackson became associated with the company as assistant treasurer last year Mr. Middleton joined the company last year, also, and later became works manager of the Production Foundries Division.

—o—

J. R. Coburn, district manager at New Orleans for the Oil Well Supply Co., U. S. Steel subsidiary, has been named manager of the South Louisiana-Mississippi district. His headquarters will be in New Orleans.

—o—

K. J. Jacobson, assistant chief chemist, Griffin Wheel Co., Chicago, has been appointed chairman of the 1947 Chemical Analysis Committee of the American Foundrymen's Association.

—o—

N. J. Koppi, R. K. LeBlond Machine Tool Co., Cincinnati, has been appointed manager of the company's Philadelphia sales offices recently opened at 3701 North Broad St., 821-22 Beury Bldg. The LeBlond Co. was formerly represented in the Philadelphia territory by the Calco Machinery Co. Mr. Koppi has been associated with the LeBlond organization for the last 22 years.

—o—

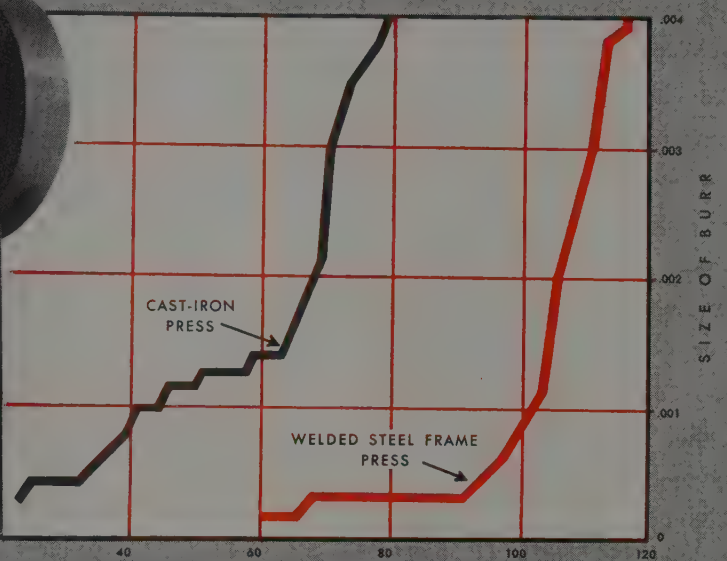
Theodore C. Jensen has been appointed superintendent of paint and enamel manufacture, and **Frank H. Russell,** su-

ERNEST E. OLDS

N. J. KOPPI

How steel's "modulus of elasticity"

cuts stamping costs!



Comparative graph showing height of burr on typical blanked part as related to the number of strokes for iron and welded steel frame presses

The widespread impression that iron is stiffer than steel because it breaks instead of bends is not true. A material's measure of stiffness is its "modulus of elasticity". Steel's modulus of elasticity is 29 million . . . 2⅓ times that of gray iron castings, 1½ times that of Meehanite or high-test castings.

This inherent stiffness of steel has been capitalized on in Warco presses and press brakes to produce rigid frames having lateral stiffness and minimum deflection even under capacity loads.

And rigid, non-deflecting frames increase the life of expensive dies, decrease maintenance, give *more parts per die grind.*

Our experienced engineers will be pleased to work with you on your press problems. Write us today for further information, or if possible, arrange to visit our modern plant, the largest of its kind in the world.

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Weldments Fully Stress-Relieved

THE SAFE COMBINATION
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Resistance Welders
WARCO
Presses and Press Brakes
SOMMER & ADAMS
Specialized Machine Tools & Plastic Molding Machines

WARREN CITY MANUFACTURING COMPANY
447 Griswold Street, Warren, Ohio
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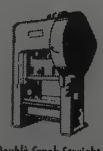

Double Crank Straight Side Press

Two Point Eccentric Gear Press

Press Brake

OBI 200 Ton Press

Hydraulic Press

75-Ton OBI Press

Horn Press

Double Crank Gap Press

perintendent of vehicle manufacture for the new Springdale, Pa., paint plant of Pittsburgh Plate Glass Co., Pittsburgh.

—o—

Roland R. Hand has been named New York district sales manager for the Deepfreeze Division, Motor Products Corp., Detroit. His headquarters will be in New York.

—o—

John B. Lanigan has been named western sales manager, Eureka Division, Eureka-Williams Corp., Detroit. He will make his headquarters in San Francisco.

—o—

George D. Behlen has been promoted to production manager and chief engineer, Bradford Machine Tool Co., Cincinnati.

—o—

Lambert R. Pistoles has been appointed production engineer, All American Aviation Inc., Manufacturing Division, Wilmington, Del. Before joining All American, Mr. Pistoles had been associated with E. I. du Pont de Nemours & Co., in charge of the method engineering department, and had previously been connected with Curtiss-Wright Corp., Caldwell, N. J., and Packard Motor Car Co., Detroit.

—o—

In a reorganization of the sales department, Cribben & Sexton Co., Chicago, has announced the following appointments: **Fred F. Lauer** has been appointed Eastern Division manager, with headquarters at Newark, N. J. He will direct all company activities from Maine to Florida. Sales representatives in this division are: **Frank E. Brown**, Boston; **Carroll Rogers**, New York; **Patrick Downey**, Buffalo; **Joseph Brucher**, Philadelphia; **John Thornton**, Newark; and **Jack Sholine**, Atlanta.

John F. Schellenberg has been appointed Central Division manager, with headquarters in Chicago. His representatives are: **Stanley Jacobson**, Cleveland; **Edward Maag**, Indianapolis; **Albert Bradtke**, Detroit; **George Mohr**, St. Louis; **Charles Dukes**, Des Moines; **M. A. Ennis**, Omaha; **Tom Heneage**, Milwaukee; **Robert Erskine**, Minneapolis.

Frank H. Goetz succeeds **Harold E. Jalass**, general sales manager, in directing activities of metropolitan Chicago, and he will be assisted by **John C. Wilkinson** and **George Waber**. The Southwest Division will continue to be handled by **James J. Marcus** in Dallas, Tex., and **Charles R. Woodson**, Los Angeles, has been appointed Pacific Division manager.

Three sales territories that have not been placed under division managership, and which continue to be operated under the direct supervision of **Mr. Jalass**, are Pittsburgh, represented by **John McMahon**; Denver, **Eugene Sparks**; and Kansas City, **Henry Shannon**.

—o—

Ralph Bradford, a member of the Chamber of Commerce of the United States, has been appointed executive vice president. He was formerly general manager of the organization, assisted by **Arch N. Booth**, who succeeds as manager of the chamber.

—o—

E. E. McEwan has been named eastern sales manager, Estate-Heatrola Division, Noma Electric Corp., New York.

—o—

C. C. Batchelder has been elected vice president, International General Electric Co., Schenectady, N. Y. **E. C. Givens** has been appointed commercial vice president.

—o—

A. D. Moss, director of purchases, B. F. Goodrich Co., Akron, will retire July 1, after serving for the past 20 years in that position.

—o—

Marco Co. Inc., Wilmington, Del., has announced two new appointments in its field sales department: **Woodrow F. Wilson** has been appointed assistant sales manager for all products. **E. L. Kuefler** has been named sales engineer to concentrate on sales and application engineering for the company's Flow-Master Pump Division.

—o—

Joseph W. Harvey has been appointed general sales manager, Vulcan Mold & Iron Co., Latrobe, Pa. He has been associated with the sales department of Vulcan since 1924.

—o—

Arthur E. Legall has been appointed purchasing agent, Spencer Turbine Co., Hartford, Conn.

—o—

John R. H. Truelsen has been appointed abrasive engineer for the Milwaukee area by the Norton Co., Worcester, Mass. **Richard H. Merchant** has been appointed field engineer in the Detroit district.

—o—

Harry O. Nordberg, formerly assistant purchasing agent, Kellogg Switchboard & Supply Co., Chicago, has been appointed purchasing agent to succeed the late **John Geiger.**

—o—

L. R. Biggs, assistant manager, Construction Engineering Division, General Electric Co., Schenectady, N. Y., has been promoted to manager. He succeeds **C. M. Rhoades**, who has retired.

—o—

W. E. Osband has been promoted to manager of the Great Lakes sales region, Packard Motor Car Co., Detroit. He had previously been manager of the organization department in the Factory Sales Division in Detroit.

—o—

Myron J. Morris, formerly service manager, Electronic Corp. of America, New York, has joined United States Television Mfg. Corp., New York, as head of the installation and maintenance department.

—o—

Earl W. Hadland, formerly manager, Chicago Division, Masonite Corp., Chicago, has been appointed manager of dealer sales. **Elmer R. Graebner** succeeds Mr. Hadland as the manager of the Chicago Division.

—o—

Dwight G. W. Hollister has been elected chairman of the board of directors, TelAutograph Corp., New York. He will continue as president and director of Business Statistics Organization Inc. **Robert L. Spotts** has been elected a director and president of the corporation.

—o—

Dean Hammond has been named chief engineer, Kaiser-Frazer Corp., Willow Run, Mich. He joined the Kaiser organization in 1944, and has been doing experimental work in both aircraft and automobiles at Emeryville, Calif., and Bristol, Pa. At Willow Run he has been engineering consultant in the use of light metal alloys in automobiles. **John L. Hallett**, vice president and chief engineer, will assume the duties of works manager of the Willow Run plant, and **John Tacke** has been named factory manager. **Stephen A. Girard** has been appointed assistant factory manager, and **Trace Jennings**, general superintendent of the Materials Division.

—o—

Walter R. Powers has been named to represent the Flex-Arm Mfg. Co., which has been recently incorporated in Los Angeles County, Calif. The directors

DEAN HAMMOND

elected to the board of the corporation are: **Mearl V. Tracy, Marion M. Tracy** and **Thomas B. Tracy,** all of Pasadena, Calif. The corporation will manufacture and sell machinery for cutting, shaping, grooving and surfacing.

—o—

T. W. Plante has been appointed superintendent of the Eliza department at the Pittsburgh Works of Jones & Laughlin Steel Corp., Pittsburgh. He had formerly held the position of superintendent of blast furnaces, Coke Works & Docks, Otis Works, Cleveland, of the corporation.

—o—

Reuben P. Rudy has been named manager of a new office recently opened at Sao Paulo, Brazil, by the Independent Pneumatic Tool Co., Chicago. He has been a representative of the company in Brazil for the past two years.

—o—

John A. Sloan, formerly district manager of the Des Moines, Iowa, branch of Mack-International Motor Truck Corp., New York, has been appointed manager at the Chicago branch. **A. L. Monck,** formerly associated with the St. Louis branch, has been named district manager in charge of the company's Des Moines branch, succeeding Mr. Sloan.

FREDERICK E. MUNSCHAUER JR.
Appointed works manager, Niagara Machine & Tool Works, Buffalo. Noted in STEEL, Mar. 31 issue, p. 74.

—o—

Herman H. Frahme, who resigned as plant superintendent and plant manager, Chemical Equipment Division, General Ceramics & Steatite Corp., Keasbey, N. J., to become vice president, Northwestern Terra Cotta Corp., Chicago, will serve United States Stoneware Co., Akron, as consulting ceramic engineer.

—o—

Harry C. Smith Jr. has been appointed acting district sales manager at Chicago for the Weirton Steel Co., Weirton, W. Va., subsidiary of National Steel Corp., pending permanent appointment of a successor to the late Kenneth M. Hunt.

—o—

J. J. Hessler has been appointed manager in charge of the Pittsburgh district office of American Bridge Co., subsidiary of United States Steel Corp. He succeeds **George E. Poucher,** who has retired after 45 years with the company.

OBITUARIES . . .

S. Frederick Kemper, 79, president, Cincinnati Die Casting Co., Cincinnati, died recently. He had been formerly president of American Pumps Inc., Cincinnati. Mr. Kemper and his son, Joseph L. H. Kemper, founded the Cincinnati Die Casting Co. in 1936.

—o—

Martin D. Hubbard, 78, founder of Hubbard Spring Co., Pontiac, Mich., died Mar. 22.

—o—

Roland F. Benzinger, president, Electric Furnace Co., Salem, O., died at his home in that city Mar. 25. He had been one of the founders of the company. Mr. Benzinger had served as president of the Industrial Furnace Manufacturers Association for several years.

—o—

John V. Beveridge, 46, purchasing engineer, Combustion Engineering Co., New York, died Mar. 27 at his home in Teaneck, N. J.

—o—

Heman Ely, 73, chairman, Greist Mfg. Co., New Haven, Conn., died Mar. 26. He had been named president of the company in 1935, from which he resigned a few weeks ago to accept the chairmanship of the company's board of directors. He had been secretary of Timken Roller Bearing Co., Canton, O., and resigned in 1925 as vice president of the company.

—o—

Thomas O. Duggan, 52, formerly vice president, Thompson Products Inc., Cleveland, died at his home in Orange, Calif., recently. Mr. Duggan had lived on the West Coast since last fall, when he resigned to become a partner in the firm of Hockaday & Philips Inc., Los Angeles.

—o—

Herbert L. Grapp, 52, president of Despatch Oven Co., Minneapolis, died suddenly Mar. 22 while on a vacation in California. During the war, he served as manager of the company, and last year had been elected president. His father, A. E. Grapp, is founder and chairman of the board of Despatch Oven.

—o—

W. W. Johnston, 70, former treasurer for over 30 years for McAleenan Bros. Co., Pittsburgh, died Mar. 28.

—o—

W. A. Rayment, 78, president of the New England Brass Co., Taunton, Mass., died recently.

—o—

Robert R. Tanner, 51, president, Tanner Chemical Co., and formerly director of research for the Parker Rust Proof Co., Detroit, died in Birmingham, Mich., Mar. 30.

—o—

Emanuel E. Lucas, 68, for 26 years an executive of Eberbach & Son Co., Ann Arbor, Mich., manufacturer of scientific instruments, died in that city Mar. 31.

—o—

Robert S. Flanagan 50, president, Flanagan Industries Inc., Skaneateles, N. Y., died of a heart attack Mar. 23.

—o—

Walter M. Mitchell, 68, retired metallurgical engineer, Westfield, N. J., died recently of a heart attack. He had been associated with the United States Steel Corp., and the Alloy Steel Corp., and had retired two years ago from the International Motor Corp., Plainfield, N. J.

—o—

John S. Nilsson, 64, retired chief marine engineer, Standard Oil Co. of New York, died Mar. 25. He had been chief engineer with the Standard Oil Co. for 25 years before his retirement two years ago.

—o—

John L. Hogan, 64, retired chief engineer, Triest Construction Co., died recently at his residence in White Plains, N. Y.

—o—

John Johnson, 85, who retired 11 years ago as superintendent, Tarrant Foundry Co., Chicago, after being associated with the company for 50 years, died Mar. 19 in that city.

—o—

Earl H. Wheeler, 56, a partner in the Poly Choke Co., Tariffville, Conn., died recently. He had been for many years, connected with the Gridley Machine Co., Windsor, Vt., and later had been an officer of the New Britain Gridley Machine Co.

—o—

Grant E. Volland, 55, associated with the Volland & Son Heating & Engineering Co., Waukesha, Wis., died recently.

—o—

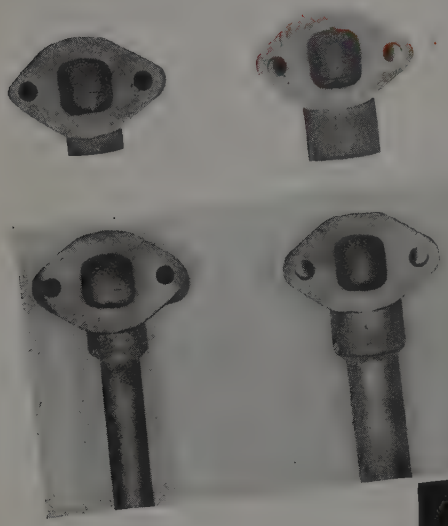
Kenneth M. Hunt, 42, Chicago district sales manager, Weirton Steel Co., died Mar. 26, in Chicago. He had represented the company in the Chicago district for 19 years.

How Silver Brazing May Simplify

CASTING DESIGN

By S. D. HERON
Consulting Engineer
Kolene Corp.
Detroit

Experimental work on multipiece silver-brazed L-head cylinder blocks and other complicated castings indicates that an assembly can be as economic and efficient as one-piece casting



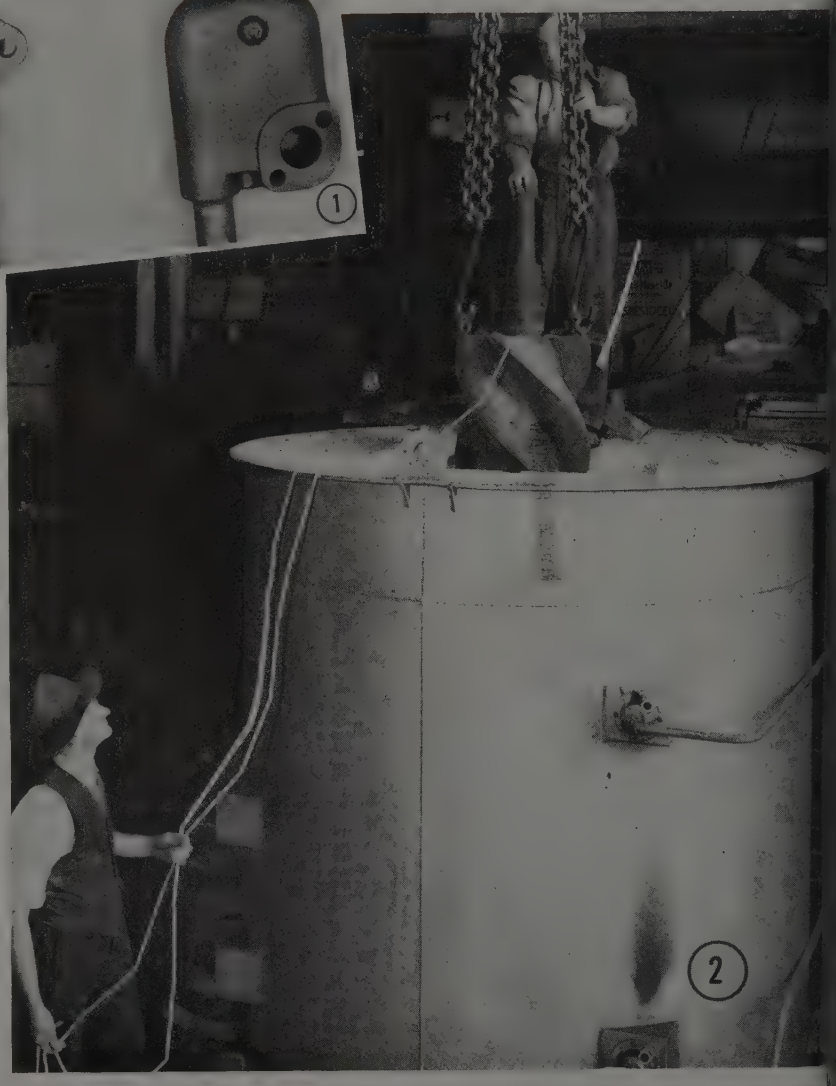


Fig. 1—Silver-brazed oil lines and cast iron fittings for high-speed diesel engines. Courtesy Detroit Diesel Engine Division, General Motors Corp.

Fig. 2—Example of silver brazing in neutral molten salt. Part is one of two rotor elements in a large air compressor built by Elliott Co., Jeannette, Pa.

Fig. 3—Cross section of conventional L-head cylinder block in which support and venting of jacket cores and their removal are difficult

Fig. 4—Revised block design in which removal of jacket cores and wires is simple because no obstructions are presented by cylinder walls. Walls are in form of sleeves silver brazed into place

Fig. 5—Special cylinder assembly for test engine. Barrel section was particularly difficult to cast because of narrow internal passages

Fig. 6—To accommodate same head design, barrel section was redesigned as shown here with the cast iron sleeve anchored mechanically to the barrel section and head

Fig. 7—Cross sections through barrel portion of assembly shown in Fig. 3. Liquid-tight castings in this design were virtually impossible

IN CERTAIN applications, gray cast iron is almost the only economical material to meet engineering design problems; in other cases, gray iron is not only the economic solution but also the best technical answer to a design problem.

Use of castings, whether of gray iron, steel or nonferrous metals, in modern engineering practice has resulted in increasingly complex designs which often are difficult to produce. Elaborate internal coring, with fragile cores which may be poorly supported and insufficiently vented, is a frequent cause of foundry difficulties, resulting in either a high scrap loss or, alternatively, castings which rarely achieve the designer's aims.

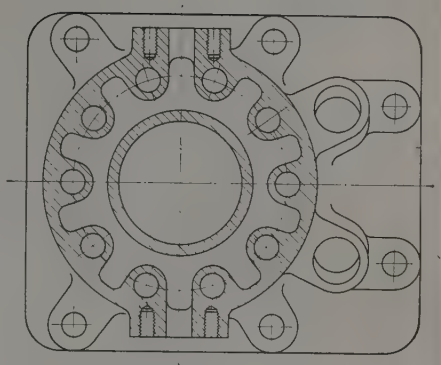
The automobile cylinder block is just one example of a difficult casting. Many castings for other purposes are designed with little or no attention to foundry problems. The designer as a rule has little knowledge of foundry practice, and the foundryman rarely has sufficient design knowledge so that he can make acceptable suggestions for redesign to simplify the foundry problem without spoiling the usefulness of the finished part.

It is often difficult to convince the designer that an assembly requiring machining of joints at the assembly points can be as economical as the one-piece casting. In some cases, assembly of either simple castings or simple castings and wrought steel parts can be attained economically by mechanical jointing, such as bolting. In other cases, silver brazing is a desirable and economical method of making the assembly.

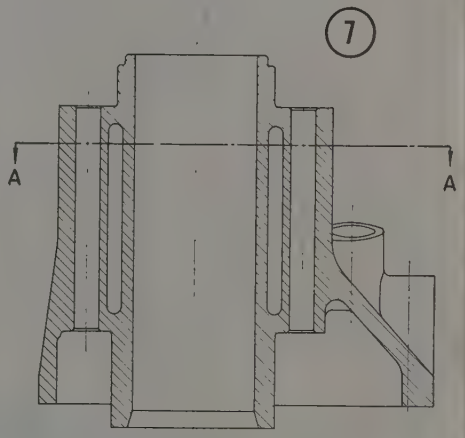
Difficulty in brazing cast iron springs from the presence of graphite, which also interferes with bonding of babbitt and other metals to cast iron. Recent developments in surface treating or scouring methods on cast iron have resulted in commercial systems for removing graphite from the surface and, as a result, gray cast iron so treated can be bronze welded readily, silver brazed or otherwise completely wetted with nonferrous metals or alloys.

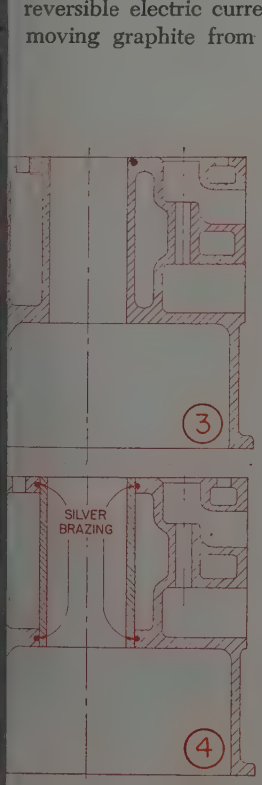
The L-head cylinder block would appear to offer possibilities of simplification by the use of silver brazing. In the case of the normal construction shown in Fig. 3, support and venting of the jacket cores are difficult. If the design shown in Fig. 1 is revised, as shown in Fig. 4, to use separate barrels held in place by silver brazing, the block casting is greatly simplified.

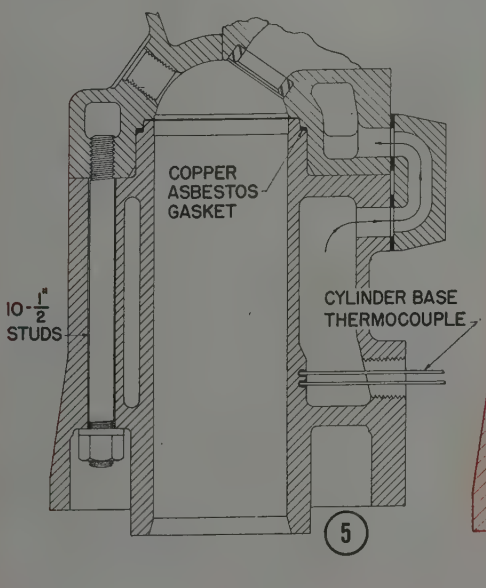
With the design shown in Fig. 4, removal of jacket cores and wires is simple and inspection to insure complete removal is easy. Molten salt with reversible electric current is one of the cleaning processes available for removing graphite from the machined surfaces; (*Please turn to Page* 120)

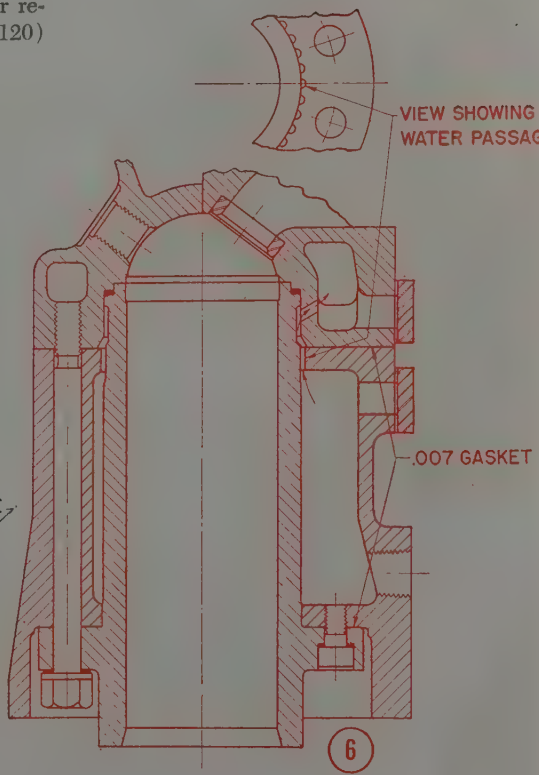


SECTION A–A









IN GEARING its production rate to one unit every 20 sec, Kalamazoo Stove & Furnace Co., Kalamazoo, Mich., makes full use of handling equipment and other production techniques to turn out stoves and furnaces for a waiting market. Between 75 and 80 per cent of all range parts in the plant are moving on conveyors all the time.

During the war, the stove company decided not to resume production of 1942 models with old tools and dies. Accompanying views reveal how the concern spent $2,500,000 in redesigning the plant—for new tools and dies, and for creating new range and furnace designs.

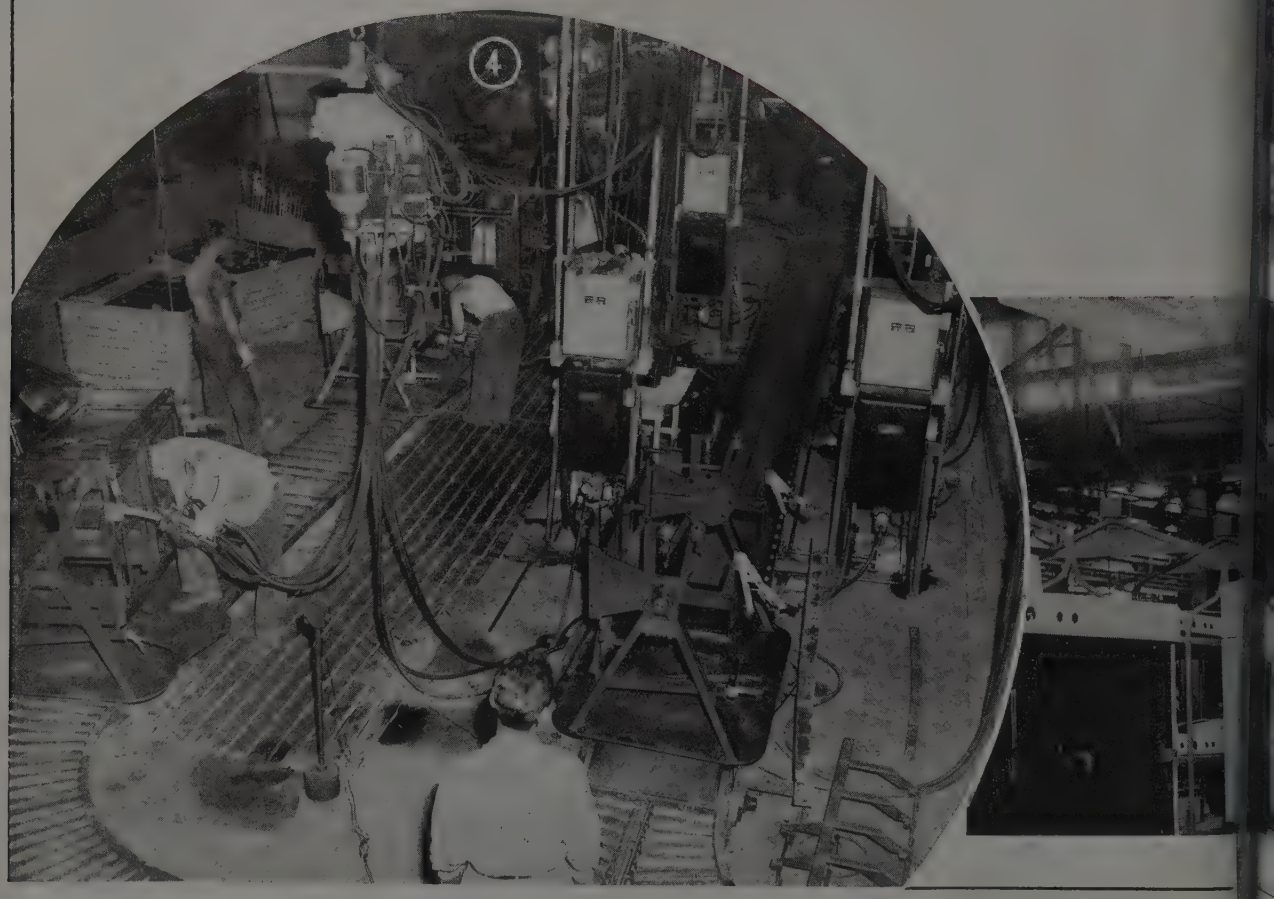
SURFACE AND OVERHEAD Conveyors

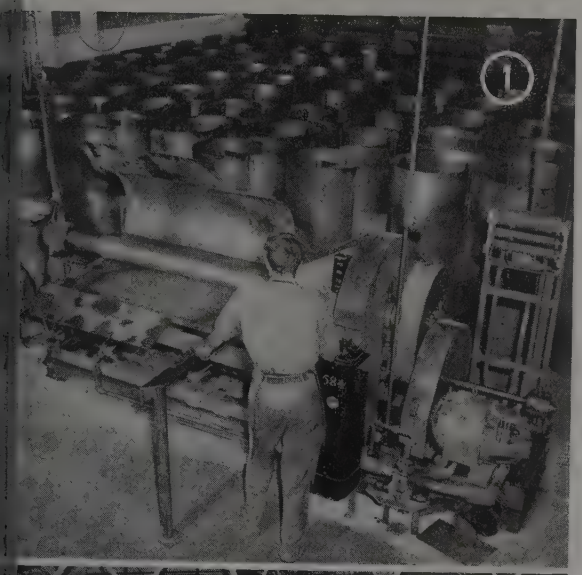
. . . help speed kitchen stoves to waiting market

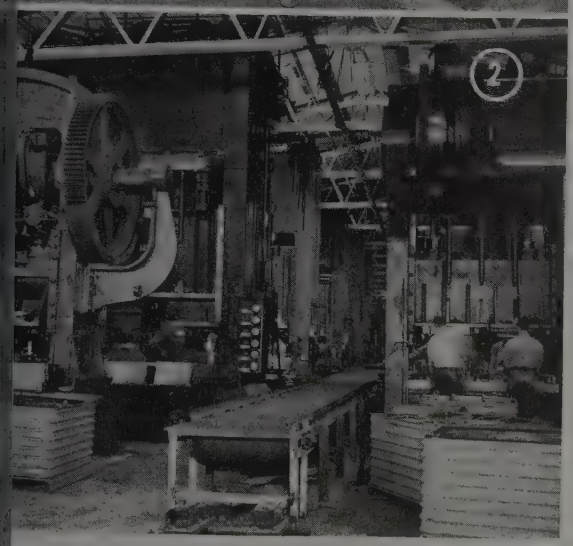
In Fig. 1, sheet steel is being rolled into furnace bodies in a rolling machine. After the body is formed, it is moved to the stock pile by an overhead conveyor. A battery of ten 250-500-ton presses, surrounded by smaller presses, stamps out steel range and furnace body parts in Fig. 2. Presses may be adapted to as many as five operations. Following stamping, parts are moved down a central conveyor belt to a degreaser.

On the spot-welding "racetrack", Fig. 4, gas ranges are handled along one outer edge of the double circle and electric ranges along the other. Empty jigs pass back down the center after welded range frames are removed to an overhead conveyor shown in the foreground.

Fig. 3 shows the gas ranges moving down the final horseshoe assembly line at the rate of 10 ft, 8 in. per minute. Note the large 3 tier overhead conveyors moving perpendicular to the assembly line. There are about 2-1/3 miles of conveyor line in the plant. Incidentally, design of gas and electric ranges provides about 65 per cent interchangeability. One piece stove tops and other parts are enameled in air-conditioned spray booths—the ground and finish porcelain enamel coats being applied to slowly moving exterior parts by automatic machine. Upon leaving the spraying area the parts are transported, suspended from a conveyor, through a continuous furnace which "binds" the enamel to the metal. Finishing touches are applied to edges by hand sprays.







Recent Developments in RARE METALS

Advances in technology of thorium, uranium, and zirconium production are, for the most part, attributed to the development of metals of high purity which are used for the preparation of these rarer elements, and to simplification in equipment design rather than changes in basic methods

HIGHLIGHTS of modern developments in methods of preparation, properties and uses of the rare metals, zirconium, thorium and uranium were recently described before the Electrochemical Society's Metropolitan Section, New York, by J. W. Marden, W. C. Lilliendahl and D. M. Wroughton of the Westinghouse Lamp Division Research Laboratory, Bloomfield, New Jersey.

These metals, according to the Westinghouse research men, all have one property in common: Their oxides cannot be reduced in hydrogen, nor can they be prepared in pure form by reduction with carbon. Thus, the methods now commercially employed for iron, nickel or copper cannot be used. Also, they are not easily melted and cast on ordinary refractories.

Interest in zirconium was reported to date back to World War I, when a rumor was extant that the Big Bertha which bombarded Paris was lined with zirconium or zirconium steel. Consequently, an attempt was made by the U. S. Bureau of Mines, at that time, to test out methods of zirconium production, and to determine the properties of this metal. It was found that small beads, obtained by aluminothermic methods, were ductile. However no large quantities could be made by this process.

The present day electrolytic process yields a good grade of zirconium powder. Zirconium finds widespread application as a "getter" or gas clean-up agent in various vacuum and gas filled devices. Both thorium and uranium have been employed in photoelectric cells to detect and measure limited portions of the violet or ultraviolet spectrum. The thoriated filament has found extended use in the electronic field and has been used as electrodes in various types of discharge devices. A tremendous growth was experienced by the uranium metal industry during the war. As was pointed out in the Smythe report, the Westinghouse Laboratories, due to experience with these rare metals, were able to produce high-grade uranium for the atomic energy experiments before commercial factories could be built for production.

Production of zirconium, thorium and uranium, in gen-

eral, involves three basic processes: (1) Electrolysis of a suitable compound of the metal in a fused salt electrolyte; (2) reduction of a compound of the metal with the alkali or alkaline earth metals; and (3) thermal decomposition of a volatile compound of the metal on a heated wire or filament. Since these metals have high melting points, they are produced by methods (1) and (2) as metal powders which may be pressed and sintered into solid compacts or in some cases, melted on a suitable refractory. Production by thermal decomposition is now commercially applied in this country by the Foote Mineral Co. to the production of zirconium from zirconium iodide.

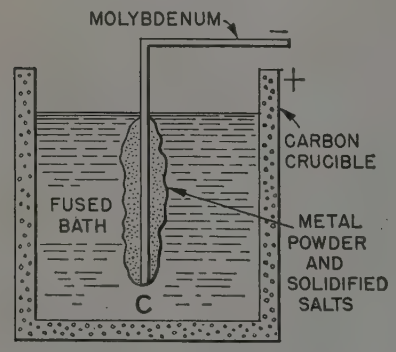
Advances in technology in the rare metal field since the early twenties has been largely the result of progress in widely divergent spheres. For example, carbon of high purity and density is now available for the construction of crucibles used in electrolysis, fabricated molybdenum cups or iron cups lined with molybdenum sheet are available for reduction to minimize contamination of the charge and calcium and magnesium of very high purity can be obtained for use as reducing agents. The introduction of Vycor glass for experimental work has enabled direct melting by induction in high vacuum or gas filled apparatus and also has enabled visual observation of the melting of such metals as zirconium with melting points exceeding 1800° C.

Thorium Production: Preparation of thorium by the electrolytic process involves the preparation of potassium thorium fluoride and its electrolysis to thorium powder in an electrolyte composed of equal parts by weight of sodium and potassium chlorides. The electrolysis is conducted in a graphite crucible which acts as the anode, a molybdenum strip centrally located and extending into the bath is the cathode. The salts are melted down and direct current voltage applied. Thorium deposits on the cathode as a loosely adhering deposit. At the completion of the run, the cathode is slowly raised out of the bath, the solidifying salts acting as a protective coating for the metal powder, preventing oxidation. The deposit is cooled and soluble salts leached out with water and dilute acid. The resulting metal powder is recovered by water washing and final drying in vacuum. Pressed metal compacts may be sintered in vacuo or melted on a suitable refractory.

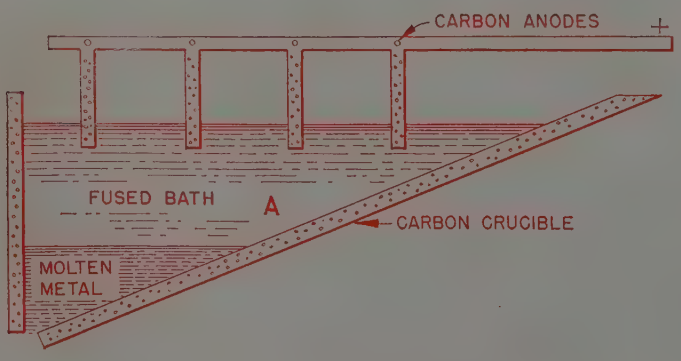
Thorium metal is very soft, having a vickers hardness of about 100. A freshly prepared surface appears bright but this becomes coated with a film of oxide which protects the metal from further attack. The density of the sintered metal is approximately 11.3 while that of the melted metal is 11.5, its x-ray density is reported to be 11.7. It may be cold rolled into wire or sheet and with highly finished rolls, sheet will remain relatively bright for some period of time in air, maintaining a high lustre. It may be cold swaged but is not readily adaptable to cold drawing because of its relatively low tensile strength.

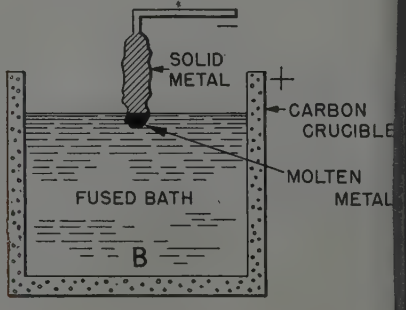
Zirconium Production: Electrolytic process described for the production of thorium has not been found equally useful for the preparation of zirconium, according to the Westinghouse report. This, in part, results from the difficulties in finding a proper electrolyte and compound of zirconium and also from the peculiar properties of the metal in readily absorbing gases at elevated temperatures with resulting embrittlement of the zirconium lattice. Fortunately, some of the properties of pure zirconium are known from classical work on the thermal decomposition of zirconium iodide by means of a heated tungsten filament. The process involves the production of zirconium powder which is converted to zirconium tetrafluoride by iodine vapor. This vapor in turn passes over a heated tungsten wire on which thermal decomposition occurs. The iodine released is free to react with fresh zirconium powder.

Attempts have been made to produce cold, ductile zirconium by reduction of the oxide, chloride and potassium zirconium fluoride, with such reducing agents as sodium, calcium and magnesium in order to develop a cheaper process so that this material could be produced in quantity and its usefulness in the electronic and related fields adequately exploited. Until quite recently, these attempts have resulted in a very hard, brittle metal. Some degree of success has been obtained by Dr. W. Kroll and co-workers at the Bureau of Mines (see STEEL, April 29 1946) and also from work at the (*Please turn to Page* 124)



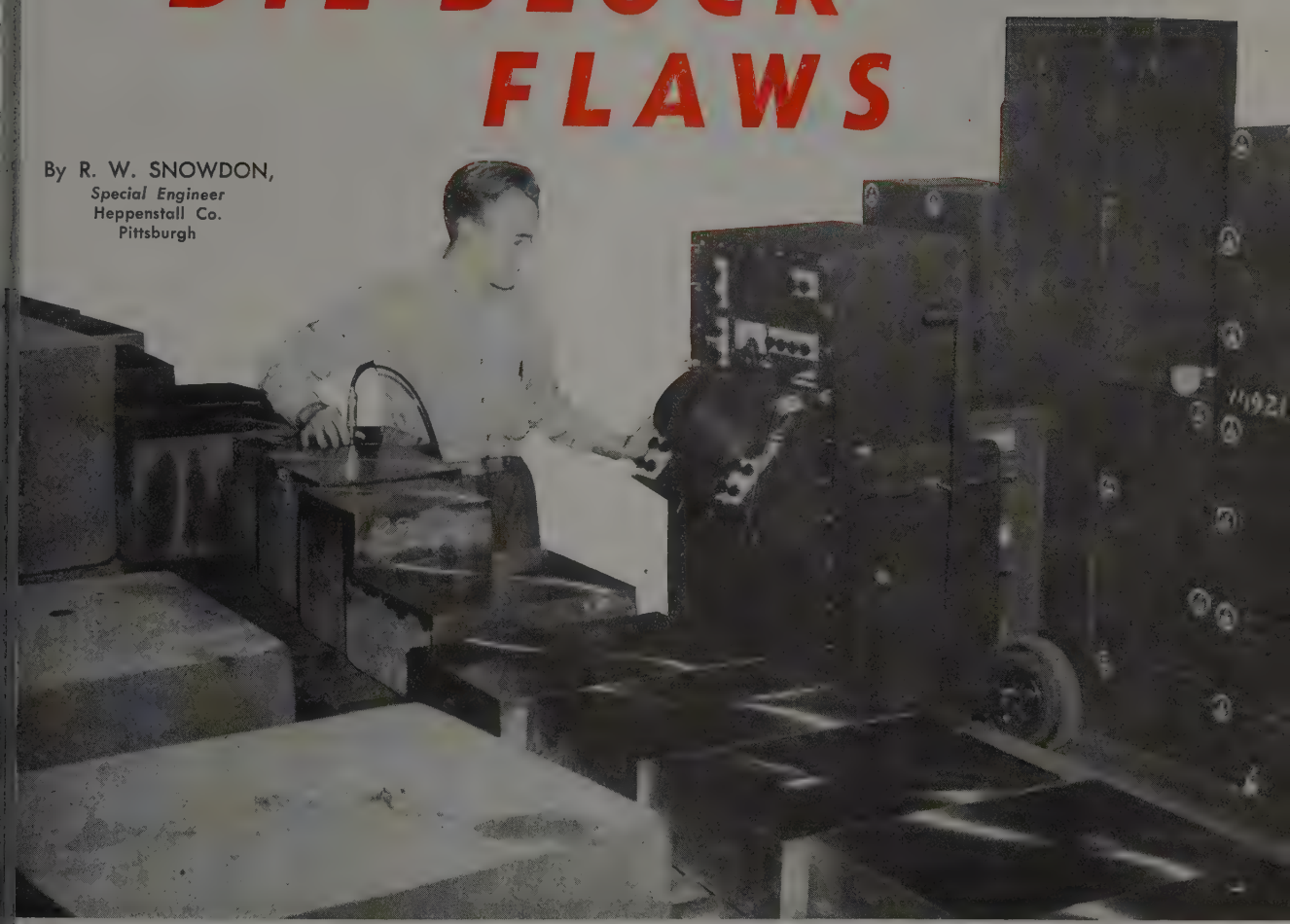
Three types of fused bath used in electrolysis: (A) Type used in the production of aluminum and magnesium; (B) electrolytic process used to prepare calcium, barium, beryllium; (C) bath used for the production of thorium and uranium





Supersonic Waves Locate DIE-BLOCK FLAWS

By R. W. SNOWDON,
Special Engineer
Heppenstall Co.
Pittsburgh



Conveyor-line testing for internal defects in dieblocks, using supersonic Reflectoscope. Instrument measures time it takes vibrations to penetrate block, reflect from opposite side or internal defect, and return to sending point. Pattern produced on an oscilloscope screen provides visual indication of any defects and their locations

INTERNAL defects in steel die blocks are detected at the Pittsburgh plant of Heppenstall Co., by a nondestructive testing method, using a supersonic Reflectoscope manufactured by Sperry Products Inc., Hoboken, N. J. The portable unit employs supersonic or ultrasonic waves which are same as sound waves in air, but extremely short.

The waves, in frequencies of 1, 2¼, or 5 megacycles, are transmitted into the material to be tested through quartz crystal ground to one of the three wave lengths listed above. Contact is effected through light insulation oil applied to the surface of the piece.

The waves are transmitted or projected through the material; if the material has a reasonably parallel surface, top and bottom, the waves are reflected from the bottom and picked up by the quartz crystal on return, causing what is known as a back reflection to appear on the sweep line on the screen of a 9-in. cathode ray oscilloscope.

Any defects such as cracks, ruptures, voids, etc. between the crystal and the bottom of the material will send back their own reflection which will appear on the sweep line between the initial pulse and the reflection from the bottom. If there are enough defects to reflect all of the wave trains, allowing none of them to reach the bottom, the back reflection does not appear on the sweep line.

The sweep line is adjustable and can be calibrated in inches, multiples of inches, or feet. The distance between the initial pulse and the back reflection, as it appears on the sweep line, represents the distance through the piece being tested. For example, if a 10-in. block is being tested, the half-cycle or squared sections of the sweep line may be set so that exactly ten of them appear between the initial pulse and the back reflection. One half-cycle represents 1 in. in this case. Then during the testing if an imperfection shows up on the sweep, it can be definitely located from the top or the bottom of the block by counting half-cycles (*Please turn to Page* 136)

Here the author relates a few first-hand experiences on cleaning before welding, at the same time reviewing mechanical and chemical methods generally used

Preweld Cleaning

By W. J. CAMPBELL
Electric Welding Division
General Electric Co.
Schenectady, N. Y.

GENERALLY speaking, cleaning methods fall into two classifications—mechanical and chemical.

One of the most widely used mechanical methods is wire brushing. In some cases this is done manually, using a small wire brush and cleaning only a very narrow area on each side of the joint. In other cases, a motor-driven rotary wire brush is used. The latter is faster and more thorough. It also is generally reliable except that mill scale, which is quite adherent, is not always removed. In addition, there is some evidence that wire brushing may be harmful to soft materials like aluminum and copper.

Grinding also may be used for cleaning, and there is available a large variety of abrasive wheels and disks desirable for this purpose. Emery paper, used manually, is quite effective. Grinding removes all dirt and surface scale and is generally satisfactory for most metals, but it cannot be applied generally where mass production is the objective.

Another abrasive method of cleaning is sandblasting. With this method the operator, attired in a coverall and a helmet equipped with respirator, directs a blast of sand under pressure of 80 to 100 lb against the work. Sandblasting removes all dirt and scale and leaves a clean although rather pitted finish, which is especially desirable if brazing is intended. It also is a high-production method of cleaning and provides a very good welding surface. Sandblasting is invariably done inside an enclosure in order to protect personnel and equipment. Small items are often sandblasted in a special enclosure designed so the operator can work outside of it. With his hands heavily gloved, he directs the blast through a small opening in the canvas enclosure and observes the result through a narrow window in the fabric.

Shotblasting is similar to sandblasting except that small, hardened steel shot is used instead of sand. Advantage of this method over sandblasting is the elimination of dust —a health hazard if not properly controlled, and the fact that the shot can be used much longer than sand. The shot should be sifted or screened from time to time to remove foreign matter. By using various sizes of shot, the finish can be varied as to the degree of coarseness desired. This method also provides a very clean and uniform welding surface. Often an assembly is tacked or bolted together before being shotblasted, and then welded. There have been instances where the hardened manganese steel shot became wedged in the joints of the assembly and then melted into the welds, causing cracking. Incidentally, the air lines for both sand and shotblasting should be free of oil and excessive moisture.

Another, although less frequently used, method of cleaning is flame cleaning. With this method, one or more oxygen-fuel gas flames are directed against the work to be cleaned. The flames burn off dirt, grease and oil. In addition, it causes scale to pop off since the latter has a smaller degree of expansion than the plate.

Chemical cleaning includes various methods which are desirable for different applications and can be adapted to high production.

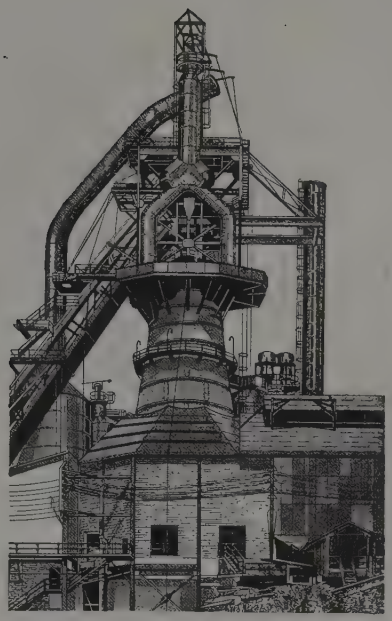
The vapor degreaser is the most widely used of these methods since it can be applied to almost all materials. In many cases, however, it does not produce final

(*Please turn to Page* 138)

POSITIONS WELDS: A 13-yd 20-ton bottom-dump trailer is shown here being arc welded in a motor-driven positioner at the Cleveland plant of Euclid Road Machinery Co. Use of positioners is said to permit 95 per cent downhand welding, thus speeding production of much-needed road-building equipment. Photo courtesy General Electric Co.

Need Grows for Smelting

FINE IRON ORES



Some of the immediate problems which confront steelmakers including New York state concentrates, bessemer practice, use of oxygen and high-top pressures in blast furnaces and electric furnace practice, are reviewed by Pittsburgh metallurgist

A FUTURE in which there may become economically practical and mechanically feasible on a large scale a direct process wholly in the solid phase with or without chemical preparation, may be envisioned by the serious student of process metallurgy. But such a development would not bring an end to the metallurgy of molten steel. This view was voiced by H. W. Graham, director metallurgy and research, Jones & Laughlin Steel Corp. Pittsburgh, in the Howe Memorial lecture—"Factors Which Determine Iron and Steelmaking Processes"—which he presented at the 75th conference of the American Institute of Mining and Metallurgical Engineers, New York, March 17-18.

No situation within the limits of practical envisionment, declared Mr. Graham, shows any end to the metallurgy of molten steel; imagination may fancy iron and steel as resulting directly or as a by-product of atomic transmutation, but that future is hidden in the as yet unrolled scroll of years to come.

While a radical development that would to any great extent supplant the blast furnace appears remote, yet clear thinking makes it necessary to realize that there is growing economic need for an iron making process which would tolerate ores of fine particle sizes. Chemistry of iron ores has a definite and determinative influence upon iron and steelmaking processes, said Mr. Graham. In United States practice, and ore below 45 per cent iron is generally considered as requiring beneficiation.

Gradual depletion of the low phosphorus ores required for acid bessemer steel making might appear as a not-to-distant threat to that process if it were not for the currently increasing production of New York state magnetites where concentration is favorable to low phosphorus. These magnetites concentrates yield phosphorus well within existing specification limits. For acid bessemer steel, the manganese content of iron ores should preferably not exceed 0.35 per cent. Other points stressed by Mr. Graham were:

For years there has been interest in the possibility of using pure oxygen to enrich the air blast for the blast furnace or bessemer, or open-hearth combustion or reactions. There has been experimentation in the field and the matter is currently active, but such proposals show no prospect of altering the essentials of the involved processes. The blast furnace will still be a blast furnace, even if supplied with a 30 per cent oxygen air blast rather than normal air with 20 per cent oxygen.

That the development of iron and steelmaking did proceed upward in temperature into the molten phase is undoubtedly the most important and far reaching condition in the processes of today.

For a century, operators and metallurgists and inventors have dreamed of ways of rejecting the gangue and achieving a direct iron product by gaseous reduction, by fluid catalysis, or by electrothermal procedure. The economic pressure is increasing, technology marches toward an ever higher level of capability, and the answer may even now be closer than it appears, he said.

Contrasted with temperature, the part played by pressure in iron and steelmaking appears relatively unimportant. The industry's processes are essentially low pressure ones. Even where an airblast is employed as in the blast furnace or converter, the pressures do not ordinarily exceed 30 psi.

It is interesting to speculate whether top pressures could be increased with consequent decrease of stockline velocity to the point where substantially no flue dust would be produced. Under such conditions the blast furnace might conceivably be able to handle the smallest particles of ore without sintering. Unfortunately it appears that under such conditions the stock column would become so dense that there is serious question if practical operation could be accomplished.

Electric furnace is the efficient modern successor to the pot crucible furnace of past generations. Its refining operations contain many features that are of great interest in the physical chemistry of molten steel and molten slags, and the exactitude that has been achieved in its manipulation is highly creditable, as is the quality of the considerable tonnage of steel manufactured by this facility.

Nevertheless, the electric furnace as used in the United States contributes little or nothing to those steps by which the industry converts iron ore into steel. Regardless of the high level of metallurgical technique employed and the high quality of steel produced, the electric furnace is a salvaging facility rather than a steelmaking unit, Mr. Graham declared.

Texas Tool Engineering Show Active,

By GUY HUBBARD
Machine Tool Editor, STEEL

FIFTEENTH annual meeting of American Society of Tool Engineers in Houston gave hundreds of members from industrial centers throughout United States and Canada, first hand impressions of strong impact of petroleum, magnesium, plastics and related activities, on theory and practice of their profession

SOME hundreds of members and guests of the American Society of Tool Engineers who journeyed from distant industrial centers in New England, the Middlewest, Canada and the West Coast, to attend the 15th annual meeting of the society in Houston, Texas, got a lot more out of it than a long journey, a change of scenery and a change in climate. They got a stimulating "short course" in the system of manufacturing as developed in the resource-rich and industrially-ambitious Southwest.

It was a "co-operative course" in that the class work in the form of technical sessions was liberally interspersed with practical work in the form of visits to great manufacturing plants, oil well drilling operations and other industrial projects. As a machine tool man from Vermont who had not been in the Southwest since World War I, I must admit that I "cut classes" to participate in the "practical shop work." When I did so, I found my old friends, Ernest Flanders of Jones & Lamson Machine Co., Springfield, Vermont and William Farrell of Cone Automatic Machine Co., Windsor, Vermont; doing exactly the same thing.

The spot where we all ran into each other was at one of the largest oil drilling rigs ever assembled. This beautifully engineered job is at Altair, Texas, 72 miles from Houston. We were there as guests of the Superior Oil Co., which went all out to show us everything—including delicate geophysical instruments by which oil deposits are located, delicate gages by means of which drilling is checked, and all of the apparatus involved in the drilling.

A lot of remarkable tool engineering enters into this. The rig itself in effect is a gigantic vertical boring machine complete with boring bars, boring heads and coolant system. In the base of the derrick, a counterpart of which appears at the upper right of this spread, is a high "spindle bearing" which revolves the boring bar, while above it is a connection through which the coolant (mud) is fed into the hollow bar. When we were there the roller bit was cutting away at the rock at a depth of 7200 ft.

If you get mad sometime when a drill or tap breaks at a depth of 7.200 in., just think how our friends down in Texas might feel if a tool went to pieces at a depth of more than one-and-one-half miles. The answer to that is that Texas tool engineers design these oil well tools so they don't break—or at least hardly ever. It costs $150,000 to drill such a well as we visited.

Visits to the Hughes Tool Co., covering 75 acres, and to the Reed Roller Bit Co., covering 28 acres, gave us an inside picture of the tremendous stamina combined with accuracy which must be engineered into oil well tools. Liberal use is made of drop forgings, which are machined, doweled and welded together. Hard facing is applied to cutting teeth by the torch method. Used tools constantly are being returned for study and constant experiments are made to effect faster cutting and longer life. Those that I saw operating on granite test blocks were turning out holes which for roundness and straightness were way ahead of anything Wilkinson did for Watt when he bored his early steam engine cylinders.

One thing in particular which impressed me in these great Texas shops, was the fact that the best machine tools are used and are pushed to the limit.

On the technical program, James F. Lincoln, president, Lincoln Electric Co., Cleveland, had a big and highly receptive audience for his discussion of "Incentive and Enterprise." As usual, he pulled no punches in his expo-

Pumping rig for raising oil from nonflowing well. Thousands of these rugged, counter-weighted gear-and-walking beam machines are running in Texas

Methods

ndependent Thinking

sition of how—through "intelligent selfishness," his prices were reduced, employment boosted and earnings were raised.

"Keeping the price of goods up to support high wages paid on some basis other than the amount of goods produced, is a sure way to trottle production, close down industry and lure people into dependence on government for their livelihood," he stated.

Two of the latest industrial adventures in Texas, magnesium and plastics, were dealt with by N. D. Griswold and Gordon B. Thayer of Dow Chemical Co. At a big plant at Freeport, Dow draws in sea water from the Gulf of Mexico and extracts the light metal from it. The nature of the location assures that magnesium bearing water constantly sweeps in, and the spent water constantly is swept away. In the manufacture of plastics the plentiful supplies of gas play a major role. In the conversion both of magnesium and plastics into finished products, tool engineers in Texas are destined to find plenty of scope for their talents.

The writer was privileged to participate in the session on Tool Engineering Education, at which Dr. W. R. Woolrich, Dean of Engineering, University of Texas, was the principal speaker. I was impressed with his statement that today the output of graduate engineers from the several fine schools in Texas far exceeds the capacity of industry in Texas to absorb them.

Therefore, Texas at the moment is exporting a lot of brains as well as a lot of raw material. My impression is that with the rapid strides being made toward conversion of Texas raw materials into finished products right in Texas, it won't be very long before a lot more of those Texas-trained engineers will be needed right in Texas.

It may be that inclusion of tool engineering a recognized branch of mechanical engineering in some of the Texas schools will prove to be one answer.

By no means is all tool engineering in Texas on the rough and ready side, even though some of the products are notably rugged. As a matter of fact, exacting accuracy is demanded on much of the oil well equipment, threads in particular. The "accuracy" phases of machine shop practice came in for attention at Houston during the session on grinding.

Frank J. Tone Jr., vice president and general sales manager, the Carborundum Co., Niagara Falls, N. Y., covered "History, Development and Progress of the Abrasive Industry." Crush dressing and diamond dressing of grinding wheels were discussed in various phases by Boyd H. Work and D. H. Currie, also of the Carborundum Co., and crush and diamond dressing as related to thread grinding was dealt with by Ernest Flanders, chief engineer, Thread Grinding Division, Jones & Lamson Machine Co., Springfield, Vermont.

Large oil well drilling rig typical of the Houston, Texas area, virtually a huge machine tool for operation on the earth instead of on metal

Other machine shop practice papers included "Machining of Magnesium," by A. M. Lennie, sales engineer, Magnesium Division, Dow Chemical Co., and "Magnesium Fabrication and Assembly Practices" by C. E. Lehnhardt, chief engineer, Magnesium Fabrication Division, both speakers being from Midland, Mich. The session on Carbides featured Philip M. McKenna, president, and W. L. Kennicott, chief engineer, Kennametal Inc., Latrobe, Pa. Visitors at both the Huges and Reed plants saw plenty of evidence of the value of carbide tools on production.

The final session on Valve and Meter Manufacture featured Col. W. F. Rockwell, president, and A. E. McIntyre, general manager, Rockwell Mfg. Co., Pittsburgh, Pa., emphasizing the role of tool engineers in making accessories used in the oil industry.

Safety

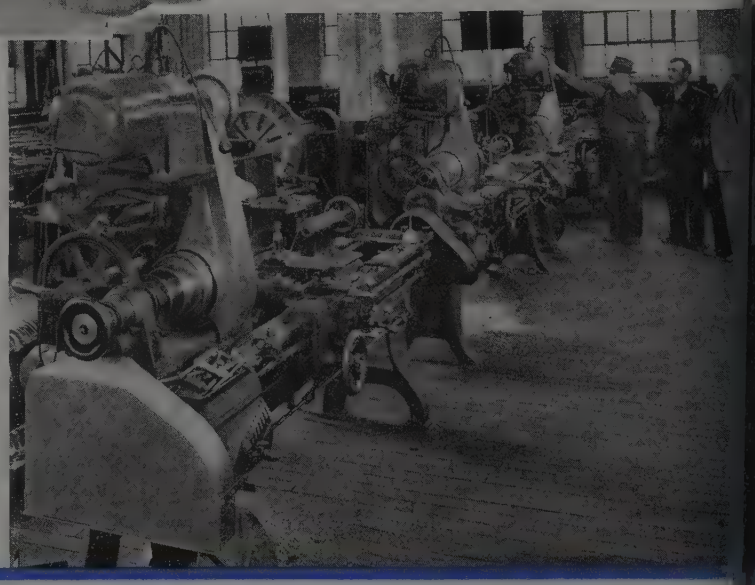
A large and many-sided manufacturing enterprise, with four foundries and numerous machine shops and assembly departments, puts a check rein on the accident rate with a continuing educational program in the hands of three safety committees

Fig. 1—Note protective clothing and equipment of men pouring molten metal in brass foundry. Method shown also minimizes accidents

Fig. 2—Allen Burnett talks over new belt guards on lathes with John Montonari, head of construction department, and James Mathews, metal and wood pattern foreman

Fig. 3—Edmond Richards, set-up man, shows old method of chucking lathe work by "tug and pry" methods. Broken wrenches and strained backs often went with operation

Fig. 4—Same lathe with air control for chuck



Program

WITH A FORCEFUL FOLLOW UP

By ROBERT H. COCHRAN
Safety Director
Chapman Valve Mfg. Co.
Indian Orchard, Mass.

VALVE manufacturing is one of the important branches of American industry. Scarcity of valves caused by tremendous wartime demands recently drove this fact home to many people who simply "took valves for granted". As a matter of fact, a company such as ours manufactures items ranging from small brass valves to huge units for waterworks and power plants. The oil industry makes use of a surprisingly wide variety of machine tools and other manufacturing equipment—including materials handling apparatus. A correspondingly wide variety of skilled tooling and manufacturing techniques is involved.

Our plant has two steel foundries, an iron foundry and a brass foundry, with numerous machine shops and assembly departments from which Chapman products are made and shipped worldwide.

From 40 workers, at the time the plant was moved from Boston to Indian Orchard in 1874, our staff now numbers 1100, embracing almost every skill known to the metal-working industry. As it should be in any business, safety is a matter of primary concern to the Chapman management.

A few years ago President John J. Duggan decided that the plant must get a more definite hold on employee injury by a better follow-up on safety, and as a result, a full-time safety director was established.

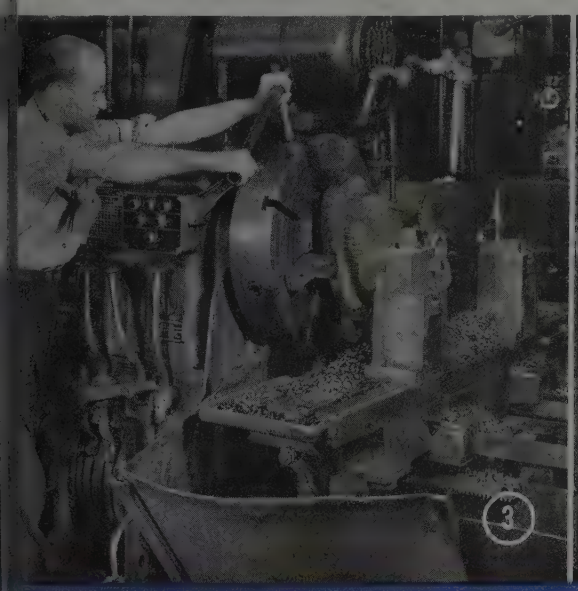
Robert L. Bancroft, Boston engineer for Employers Mutuals of Wausau, Wisconsin, our insurance carrier, has been considerably helpful in constructive suggestions for a workable safety program.

Our first step was to organize three safety committees. These were composed of foremen and workers from the two shifts in the machine shops and foremen and workers from the foundries. Each of these committees meets with us regularly each month. Mr. Bancroft, who carefully inspects one or more plant departments each month, is also on hand with specific recommendations for improvement. Accidents and hazardous conditions are freely discussed and ways and means are found to eliminate them. Educational films are shown, supplied by the company and the insurance carrier.

Chapman foremen know and understand that safety is primarily their responsibility. Just as it is their job to maintain production and keep equipment in good shape, so is it their job to see that work is done safely.

The foreman must be a key man in any safety program, just as he is in a production program. A safe plant is the result of care and safe practice of each individual and the foreman is in the best position to awaken the best cooperation from the individual. His department is small enough that he knows the type of appeal that will make each worker respond best. He knows their likes and dislikes, something of their domestic background, financial troubles and such matters as have a bearing on a man's frame of mind. One man may be proud of his skill which would be impaired by the loss of a finger in an accident. Another may have worked hard to earn better pay which an accident might reduce. Family pride will appeal to another worker as a reason for being careful. The wise foreman can know these things and use them to advantage.

Our plant, like many others, has certain special safety problems that we have met and guarded against with the help and advice of our insurance safety engineers. We have quite a number of small power trucks which transport materials through our 500,000 feet of factory floor space. Once it was possible for most anyone to operate them with little or no training. That is all over now. We have a strict traffic training program. License cards are



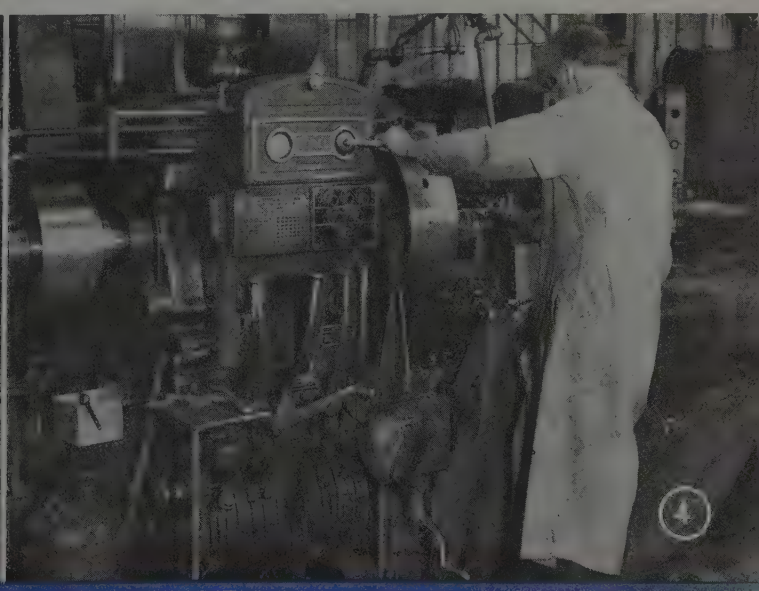


Fig. 5—Note manometers for registering radiation rays on arms of Joseph Shea and C. D'Elia as they set casting in radiation-proof x-ray room for million-volt machine. Door must be locked shut before machine is turned on

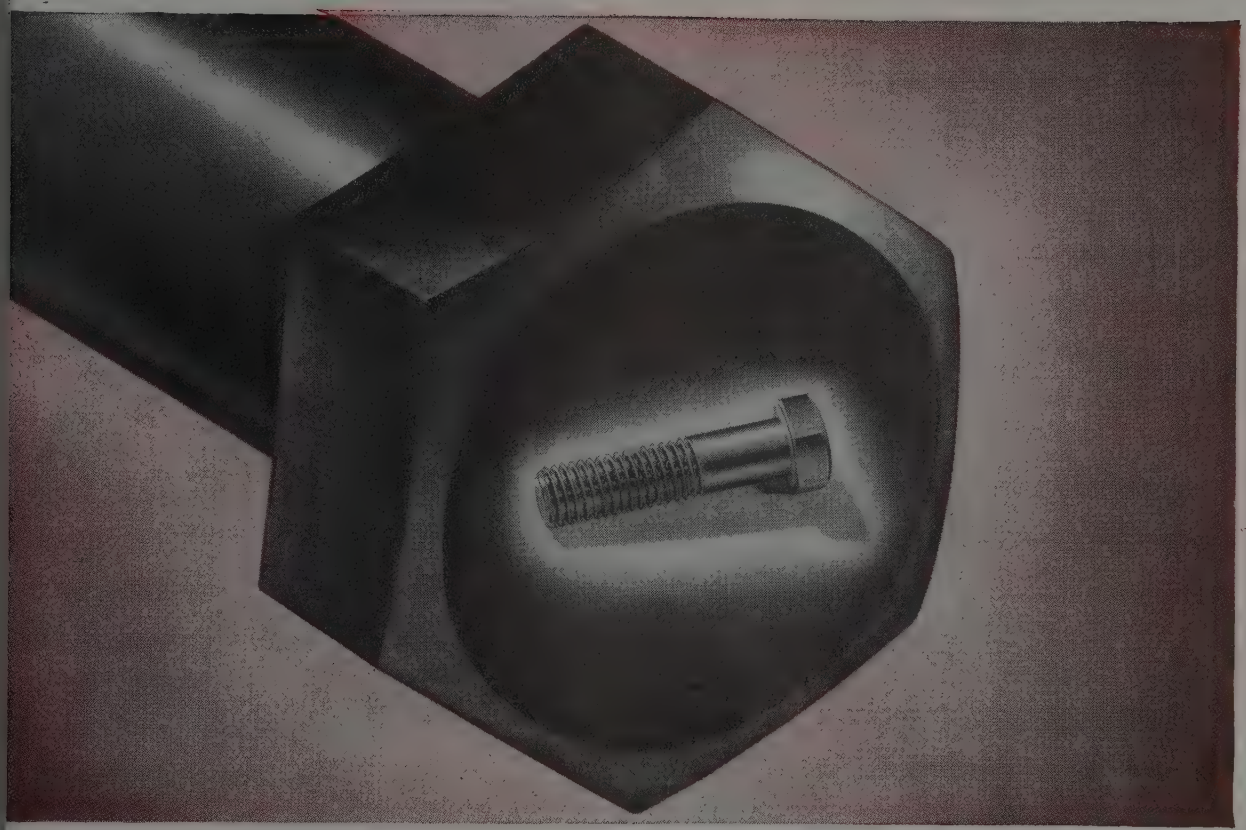
Fig. 6—The author and his assistant, John T. McGowan, look over records in plant safety office

issued on which the rules for operation are printed and none but licensed operators use our trucks (Fig. 9).

There's a lot of heavy lifting in our business. We have a large amount of hoist equipment and we entrust the inspection of these hoists, cables and chain slings only to one man. He is also responsible for the method in which the chain slings are used on the great variety of sizes and shapes of castings handled in the foundry and other parts of the plant (Fig. 8).

Hard physical effort likely to cause strains and other injuries has been eliminated wherever possible. An example of how such a procedure was improved is shown in Figs. 3 and 4. The first photograph shows the old method of chucking work. While this happens to be in a Potter and Johnson lathe, it is common practice in all sorts of lathes. A long piece of pipe is affixed to the handle, putting more strain on the wrench than that for which it was designed. Workers using this method were sometimes thrown to the floor when the wrench would slip from its socket. Wallace Metcalf, our tool engineer, took care of this with a new air control. William Einert, foreman, approves of it. The new device not only holds the work more firmly than the mechanical chuck, but eliminates the other dangers mentioned.

Before we had guarded our lathes in the metal pattern shop (Fig. 2) we had a serious accident when an operator took hold of the belt to turn the lathe over and another accidentally started the machine. This carried his hand between



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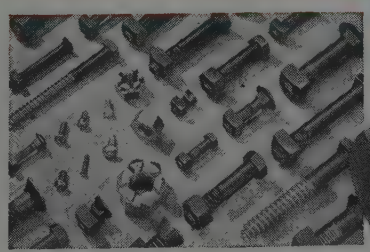

the belt and the cone pulley. These guards are in two sections, one being over the speed control gears on the end of the lathes, the other over the belt which runs from the motor drive to the cone pulley. Now a hand wheel on the end of the shaft permits the lathe operator to turn the lathe over without touching the belt.

One of our prize pieces of equipment is our million-volt x-ray machine which shows up the tiniest flaws in any casting. The extremely heavy door (Fig. 5) is equipped with an interlock which makes it impossible to turn on the x-ray unless this door into the main foundry is tightly closed. Operators making the set-up are equipped with manometers which warn of any stray ray. This room is a separate concrete building with 18 in. walls to prevent radiation. Floor is covered with sand which is changed every week. Periodic check is made of the blood count of every employee in this department.

In the brass foundry all pouring is done from pots suspended from an overhead trolley. The chain fall is guided into position by one man while the pot is tilted by another. (Fig. 1). This is the safest known method of handling small pots of molten metal.

We are also quite proud of our modern first aid department. (Fig. 7). This is in charge of Mrs. Beatrice Supernow, registered nurse, who is assisted by three full time nurses. Grace De Wolfe, registered nurse of the Employers Mutuals Nursing Division calls on this department frequently and gives our nurses the advantage of wide practical experience in plant hospital problems.

In the three years that our safety department has been at work, our accident frequency has been held to an extremely low rate. Records for the 1943-45 years are: 1943—8.763; 1944—5.966; 1945—5.900.

In this work J. T. McGowan, my assistant, and I have had the fullest support and co-operation from Mr. Duggan and top management generally.

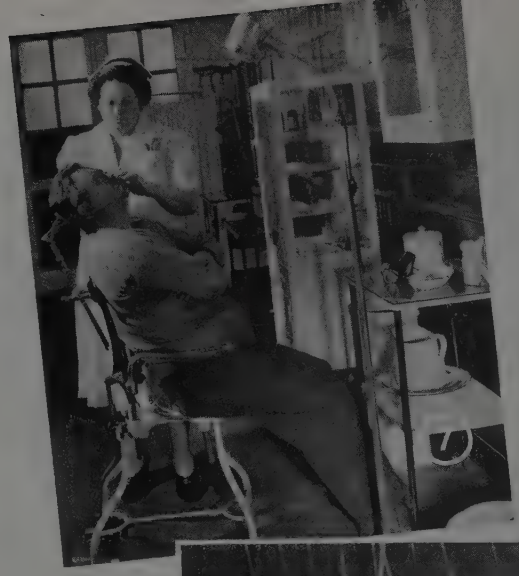

Fig. 7—Mrs. Beatrice Supernow, chief nurse in plant hospital, removes particle from eye of worker

Fig. 8—Rolland Ducharme, in charge of hoist inspection, looks over cables with Allen Burnett, maintenance head

Fig. 9—Stanley Harrica, instructor of electric truck operation, hands license card to Walter Willette, operator, as Arthur White, foreman, looks on

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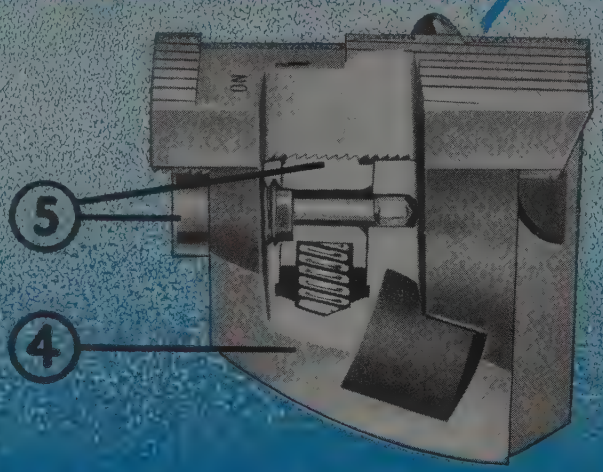

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2. Jones & Lamson Ground Thread Tangent Chasers are guaranteed to produce threads to Class III specifications.

3. *The exact helix angle, in fact all the elements of an accurate thread are ground into the chasers after hardening.* The possibility of poor quality threads and costly scrap, due to faulty chaser setting, is eliminated.

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4. *Jones & Lamson Tangent Chaser Die Heads are universal. Only one set of chaser holders is required for all right-hand threads, and only one set of holders is required for all left-hand threads within the rated capacity of the die head, regardless of pitch or diameter* Investment in chaser holders is reduced to a minimum. Change over and set up is speeded.

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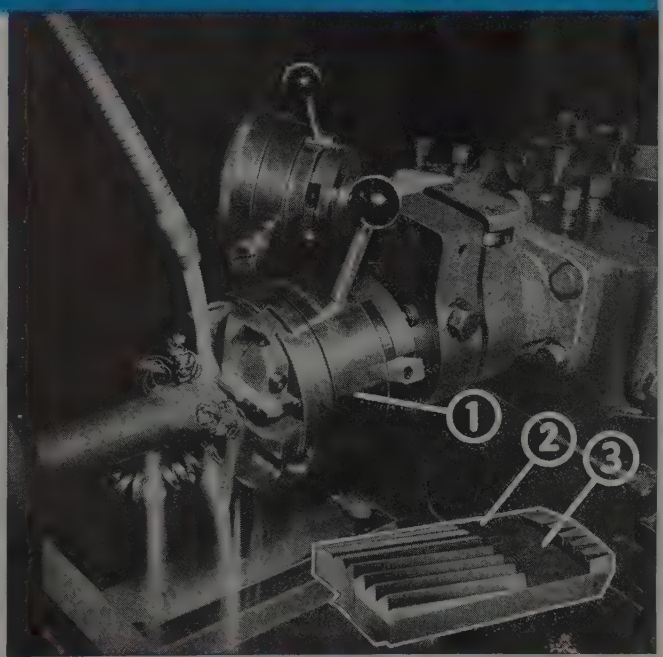

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Plugging Relays Minimize Motor Reversing Time

By R. B. IMMEL
Design Engineer
Westinghouse Electric Corp.
East Pittsburgh, Pa.

Two units employed in plugging system are connected so that when a motor is started from standstill, the plugging step is shorted out immediately. When motor is reversed or plugged in motion closing of plugging contactor is prevented until armature comes almost to idle position

PLUGGING a direct-current drive motor—accepted method of reversing it in minimum time—is accomplished by reversing the polarity of the voltage applied to the motor armature when it is rotating at full speed. In this manner, power from the line can be utilized to decelerate a motor.

Just after a motor is plugged, approximately two times rated voltage is impressed upon the controller starting resistor circuit. This occurs as the counter emf generated in a motor by the armature conductors moving in a magnetic field has a polarity that adds to the line or supply voltage. Because of this higher voltage, the total resistance in the armature circuit during plugging should be approximately twice that required during the initial starting period if the same limitation of the current peaks is to be obtained. Plugging reversing controllers are generally arranged so that all steps of the starting resistor and an additional resistor step known as the "plugging resistor" are automatically inserted into the motor armature circuit to limit the plugging current.

Plugging reversing controllers are almost universally used for crane bridge and trolley motor control. They are also widely applied to steel mill auxiliary service applications such as screwdowns, manipulators, cooling tables, ingot buggies, lift and roll-out tables, bar pullers, and any other dc motor applications where minimum reversing time is desired from full speed in one direction to full speed in the opposite direction. For these applications a plugging reversing controller is advantageous over a straight reversing controller as it definitely increases the output or production of a given machine.

Basically, the operation of safely plugging a dc motor required the reversal of the motor armature voltage polarity, the insertion of sufficient resistance in the armature circuit, and the shorting-out or removal of the plugging resistor at or just before the motor armature reaches zero speed so that the normal opposite direction acceleration of the

Fig. 1—Plugging reversing controllers are widely applied on blooming mill installations

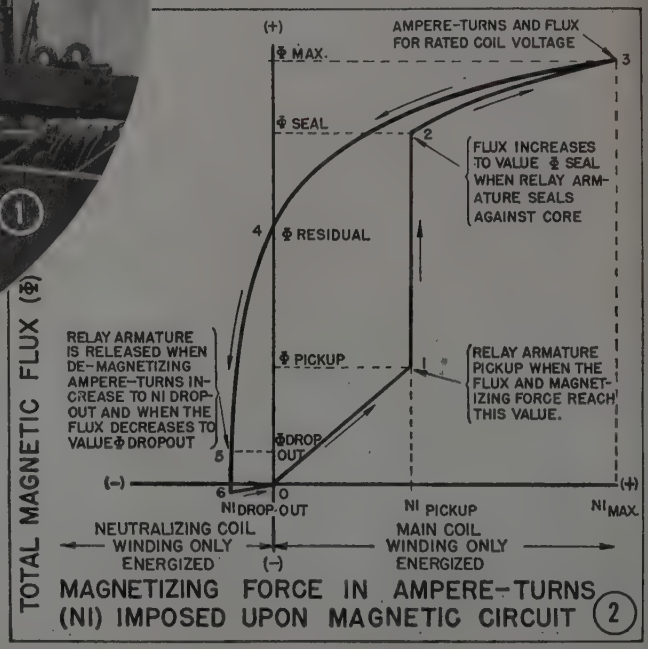

Fig. 2—Hysteresis curve for a magnetically-operated plugging relay

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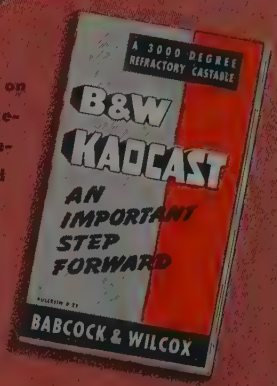

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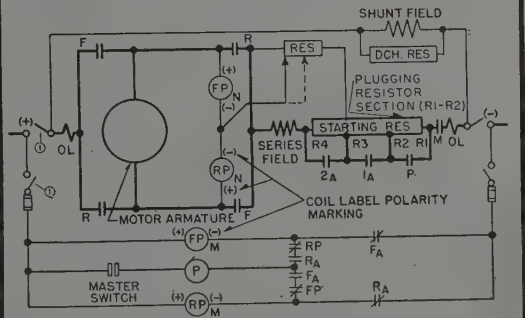
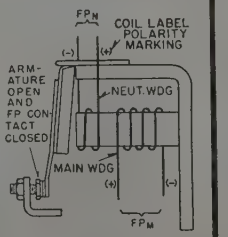
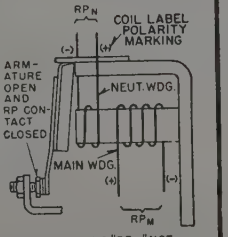
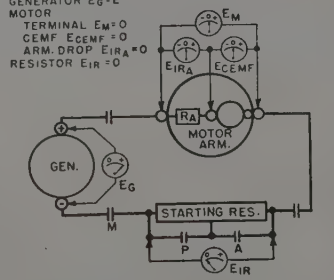
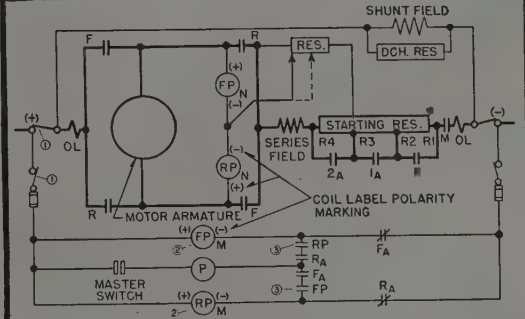
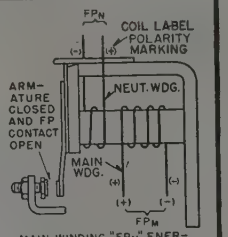
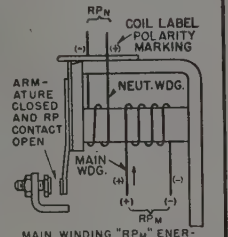
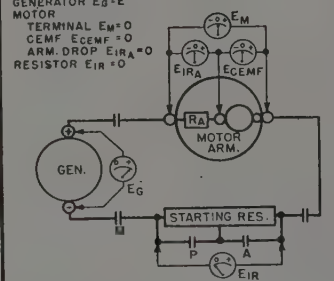
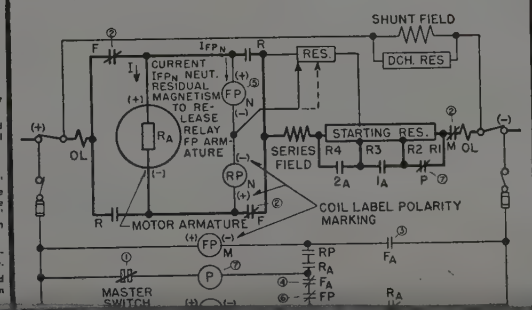
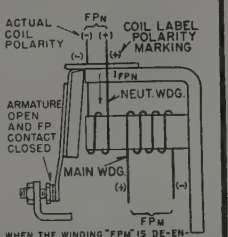
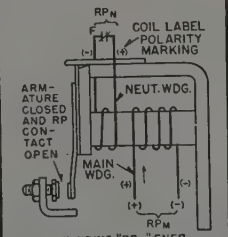
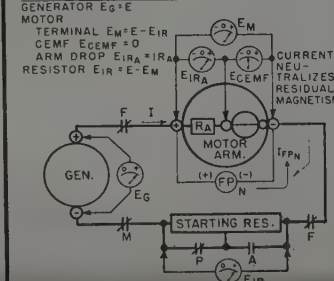
Operation of Magnetic Plugging Relays in a Plugging Controller

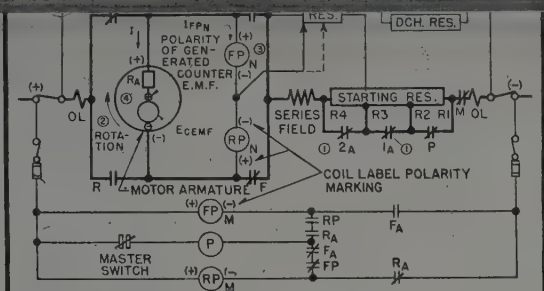
(Operation sequence will be similar when motor is first started in reverse direction)

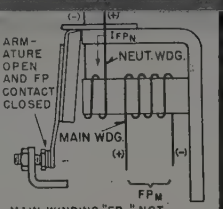
OPERATION SEQUENCE STEP	DESCRIPTION	ELEMENTARY DIAGRAM	MAGNETIC PLUGGING RELAY FOR FWD. DIRECTION	MAGNETIC PLUGGING RELAY FOR REV. DIRECTION	SIMPLIFIED ELEMENTARY DIAGRAM
A	**MOTOR ARMATURE AT STANDSTILL** Main motor and control circuits de-energized.		 MAIN WINDING "FPM" NOT ENERGIZED NEUT WINDING "FPN" NOT ENERGIZED	 MAIN WINDING "RPM" NOT ENERGIZED NEUT WINDING "RPN" NOT ENERGIZED	VOLTAGE RELATIONSHIPS GENERATOR $E_G = E$ MOTOR TERMINAL $E_M = 0$ CEMF $E_{CEMF} = 0$ ARM. DROP $E_{IR_A} = 0$ RESISTOR $E_{IR} = 0$ 
B	**MOTOR ARMATURE AT STANDSTILL** 1. Main motor and control circuits energized by the closing of the main and control knife switches. 2. The main coil windings "FPM" and "RPM" of the plugging relays are energized. 3. The normally closed contacts "FP" and "RP" open and the plugging relay armatures are held closed magnetically.		 MAIN WINDING "FPM" ENERGIZED AND ARMATURE HELD CLOSED MAGNETICALLY NEUT. WINDING "FPN" NOT ENERGIZED	 MAIN WINDING "RPM" ENERGIZED AND ARMATURE HELD CLOSED MAGNETICALLY NEUT. WINDING "RPN" NOT ENERGIZED	VOLTAGE RELATIONSHIPS GENERATOR $E_G = E$ MOTOR TERMINAL $E_M = 0$ CEMF $E_{CEMF} = 0$ ARM. DROP $E_{IR_A} = 0$ RESISTOR $E_{IR} = 0$ 
C	**INSTANT AFTER POWER IS APPLIED TO THE ARMATURE (ARMATURE AT APPROX. STANDSTILL)** 1. Master switch closed for Forward direction. 2. Contactors "F" and "M" close and apply power to motor. 3. The normally closed aux. contact "F_A" opens and de-energizes the Forward plugging relay main coil winding "FPM". 4. The normally open aux. contact "F_A" closes. 5. As the Forward plugging relay Neut. coil "FPN" is connected in parallel with the motor armature, the voltage applied to coil "FPN" will be equal to the motor IR_A drop. The current flow through coil "FPN" is correct for neutralizing the residual magnetism in the Forward plugging relay frame. 6. The Forward plugging relay armature will be immediately released and the contact "FP" will close. 7. The plugging contactor coil "P" is then energized and the contact "P" will close to short out section "R1-R2" of the starting resistor.		 WHEN THE WINDING "FPM" IS DE-ENERGIZED, THE ARMATURE MOMENTARILY REMAINS CLOSED AS IT IS HELD BY RESIDUAL MAGNETISM. THE MAGNETIC FIELD OF THE NEUT. COIL "FPN" IS IN OPPOSITION TO THAT OF THE MAIN WINDING AND RESIDUAL FIELD. WHEN THE RESIDUAL MAGNETISM IS NEU-	 MAIN WINDING "RPM" ENERGIZED AND ARMATURE HELD CLOSED MAGNETICALLY. NEUT. WINDING "RPN" IS SHORT-CIRCUITED BY CONTACT "F".	VOLTAGE RELATIONSHIPS GENERATOR $E_G = E$ MOTOR TERMINAL $E_M = E - E_{IR}$ CEMF $E_{CEMF} = 0$ ARM DROP $E_{IR_A} = IR_A$ RESISTOR $E_{IR} = E - E_M$ 

D

MOTOR ARMATURE AT FULL SPEED FORWARD

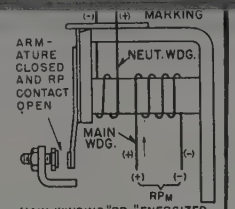
1. The accelerating contactors "1A" and "2A" which are controlled by definite time limit relays close in succession to short out the starting resistor.
2. With full line voltage on the armature, the motor will run at full speed in the Forward direction.
3. The magnetic field produced by the current "I_{FP_N}" flowing through the winding "FP_N" is not sufficient to close the armature of the Forward plugging relay.
4. A d-c motor can be represented by a resistor (to represent the armature resistance) and a generator (for generation of the counter E.M.F.) in series.





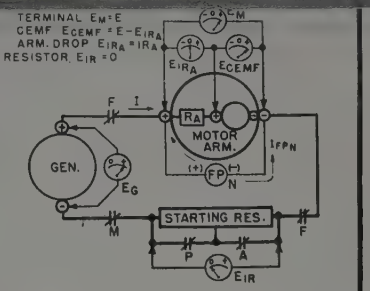
MAIN WINDING "FP_M" NOT ENERGIZED.

THE MAGNETIC FIELD OF THE NEUT. WINDING "FP_N" IS NOT SUFFICIENT TO CLOSE THE ARMATURE.



MAIN WINDING "RP_M" ENERGIZED AND ARMATURE HELD CLOSED MAGNETICALLY.

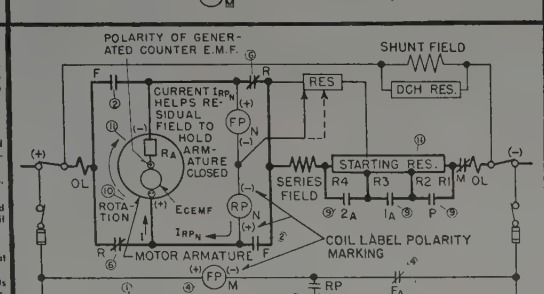
NEUT. WINDING "RP_N" IS SHORT-CIRCUITED BY CONTACT "F".

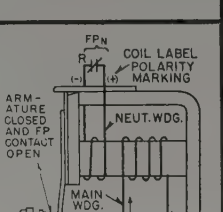


E

MOTOR PLUGGED BY APPLYING A VOLTAGE OF OPPOSITE POLARITY TO THE ARMATURE

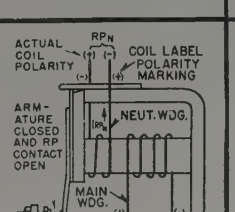
1. To reverse the direction of the motor armature rotation, the master switch is moved from its Forward to its Reverse position. The master switch contact shown opens and then recloses.
2. Reversing contactor "F" opens.
3. The normally open aux. contact "F_A" opens.
4. The normally closed aux. contact "F_A" closes and energizes the Forward plugging relay main coil winding "FP_M"
5. The Forward plugging relay contact "FP" opens.
6. Contactor "R" closes.
7. The normally closed aux. contact "R_A" opens and de-energizes the Reverse plugging relay main coil winding "RP_M".
8. The normally open aux. contact "R_A" closes.
9. The contactors "P", "1A", and "2A" open so that the resistor can limit the plugging current.
10. The speed of the motor steadily decreases, but its inertia causes it to continue to rotate in the same direction despite the reversal of the magnetic torque forces.
11. As the motor counter E.M.F. "E_{CEMF}" and the generator voltage "E" are in series, the voltage applied to the starting resistor is approximately two times the normal value. The plugging resistor section "R1-R2" limits the current to a safe value.





MAIN WINDING "FP_M" ENERGIZED AND ARMATURE HELD CLOSED MAGNETICALLY

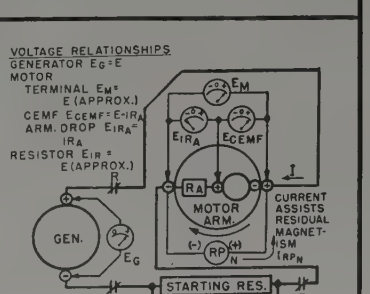
NEUT WINDING "FP_N" IS SHORT-CIRCUITED BY CONTACT "R"



MAIN COIL WINDING "RP_M" DE-ENERGIZED

ARMATURE HELD CLOSED BY RESIDUAL MAGNETISM

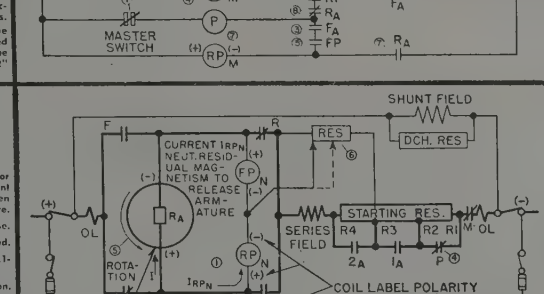
THE MAGNETIC FIELD OF THE NEUT WINDING ASSISTS THE RESIDUAL FIELD IN HOLDING THE ARMATURE CLOSED

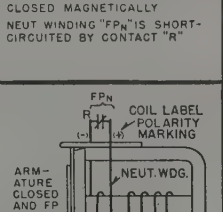


F

INSTANT AFTER MOTOR ARMATURE REACHES ZERO SPEED

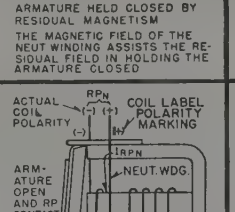
1. When the motor counter E.M.F. is equal to the motor I_RA drop, the Reverse plugging relay Neut. coil current reverses its direction. The Neut. coil "RP_N" field then neutralizes the residual field and releases the armature.
2. The Reverse plugging relay contact "RP" will close.
3. The plugging contactor coil "P" will be energized.
4. Contacts "P" will close and short out section "R1-R2" of the starting resistor.
5. The motor then accelerates in the reverse direction.
6. The motor speed at which the Reverse plugging relay will drop-out can be adjusted by moving the slider on the potentiometer to the dotted line position. This produces an effect equivalent to increasing the motor I_RA drop. This adjusting means makes it possible to cut out the plugging resistor prior to or at exactly motor armature zero speed.



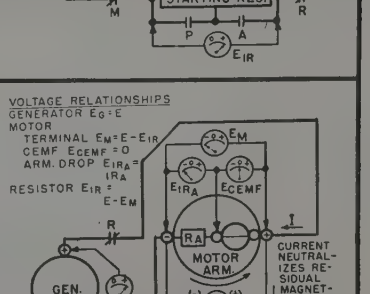


MAIN WINDING "FP_M" ENERGIZED AND ARMATURE HELD CLOSED MAGNETICALLY

NEUT. WINDING "FP_N" IS SHORT-CIRCUITED BY CONTACT "R"



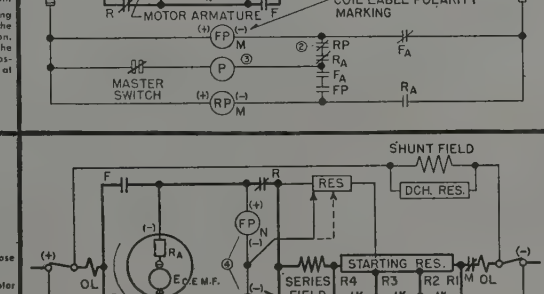
THE ARMATURE WHICH HAS BEEN HELD CLOSED BY RESIDUAL MAGNETISM IS RELEASED WHEN THE RESIDUAL FIELD IS NEUTRALIZED BY THE FIELD PRODUCED BY THE NEUT. WINDING, CONTACT "RP" CLOSES

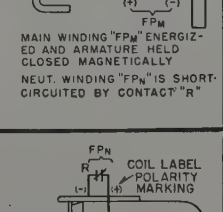


G

MOTOR ARMATURE AT FULL SPEED REVERSE

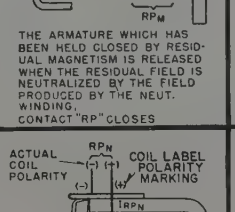
1. The accelerating contactors "1A" and "2A" close after a time delay to short out the starting resistor.
2. With full line voltage on the armature, the motor will run at full speed in the Reverse direction.
3. The magnetic field produced by the current "IRP_N" flowing through the winding "RP_N" is not sufficient to close the armature of the Reverse plugging relay.
4. Two plugging relays are applied in this circuit so that the plugging control operates the same regardless of whether the motor is initially running in the Forward or Reverse direction.





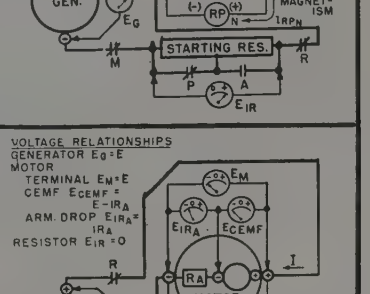
MAIN WINDING "FP_M" ENERGIZED AND ARMATURE HELD CLOSED MAGNETICALLY

NEUT WINDING "FP_N" IS SHORT-CIRCUITED BY CONTACT "R"



MAIN WINDING "RP_M" NOT ENERGIZED

THE MAGNETIC FIELD OF THE NEUT WINDING "RP_N" IS NOT STRONG ENOUGH TO CLOSE THE ARMATURE



motor can be accomplished.

The operation of shorting-out the plugging resistor must be accurately timed with respect to the instant when the motor armature reaches zero speed. If the plugging resistor is cut out too soon or before the motor armature reaches zero speed, the armature current peaks may be excessive for many applications. Also, if the plugging resistor is shorted-out too late or after the armature passes through the zero speed point, the reversing operation time will be increased and the maximum possible production output will be decreased.

Magnetically Operated Plugging Relays

a. Description: Successful operation of a plugging reversing controller depends entirely upon the device or means that is employed to control the insertion or removal of the plugging resistor. This device is actually the "brains" of the controller.

One of the most successful plugging schemes used during the last several years employs dc magnetically-operated plugging relays. Two plugging relays are required for this circuit and the relays are connected so that when a motor is started from stand-still, the plugging resistor step is immediately shorted-out. When the motor is reversed and plugged while in motion, the plugging resistor is inserted in the armature circuit immediately and one of the plugging relays will prevent the closing of the plugging contactor until the motor armature decelerates to approximately zero speed.

A typical plugging relay is shown in Fig. 4. The single-break normally closed contact on a relay of this type is usually suitable for carrying 5 amp continuously. This relay is exceptionally sturdy and is of unit construction. The armature and moving contact assembly is the only moving part. The armature pivots on a knife-edge bearing which consists of the beveled upper end of the armature and the surfaces of the frame and bearing plate which meet at a right angle.

Unit construction is advantageous as it permits a relay to be completely assembled and tested at the factory before shipment. This particular design of relay will withstand a large number of operations because of the knife-edge bearing and there are exceptionally few moving parts. Also, a knife-edge bearing of this type is not usually affected by dust or dirt. Hard chromium plating on the ground surfaces of the armature and frame provides good protection against corrosion and mechanical wear. The normally closed contact has fine silver contact buttons and also serves as the armature stop.

This type of plugging relay is operated by a two-winding coil. The terminals for the main (or pickup) winding, which is used for closing the relay armature, are at the bottom of the coil. The neutralizing winding, the terminals of which are at the top of the coil, controls the release of the armature and the reclosing of the contacts. The neutralizing winding is wound with a copper-nickel alloy wire which has a low coefficient of resistance so that temperature changes will have only a negligible effect on the performance of the plugging relay.

b. Operation: The magnetic circuit of this relay is composed of an inverted "L"-shaped frame with a round core riveted into it and an armature which forms the moving part of the magnetic circuit. There are substantially no air-gaps or nonmagnetic spacers in the magnetic circuit when the armature is in the sealed (or closed) position. This is essential as the relay operates on a principle that requires the reluctance of the magnetic circuit be as low as possible.

When the main (or pickup) winding section of the coil is energized with a dc voltage that is within the operating limits, the relay armature will be attracted toward and will seal against the iron core. The normally closed contact will open immediately after the armature starts to move. Increase in magnetic flux with an increase in the magnetizing force is shown by the ascending portion of the curve marked 0-1-2-3 in Fig. 2.

From 0 to point 1 the relay armature is in its open position. The magnetic flux increases directly with the magnetizing force, which in turn varies directly with the voltage on and the resultant current flowing through the main coil winding. When the magnetizing force increases to the value NI(pickup) on the abscissae and the flux attains a value of ϕ(pickup) on the ordinate, the magnetic force acting upon the relay armature is sufficient to overcome the mechanical force of the kickout spring which re-

(*Please turn to Page* 142)

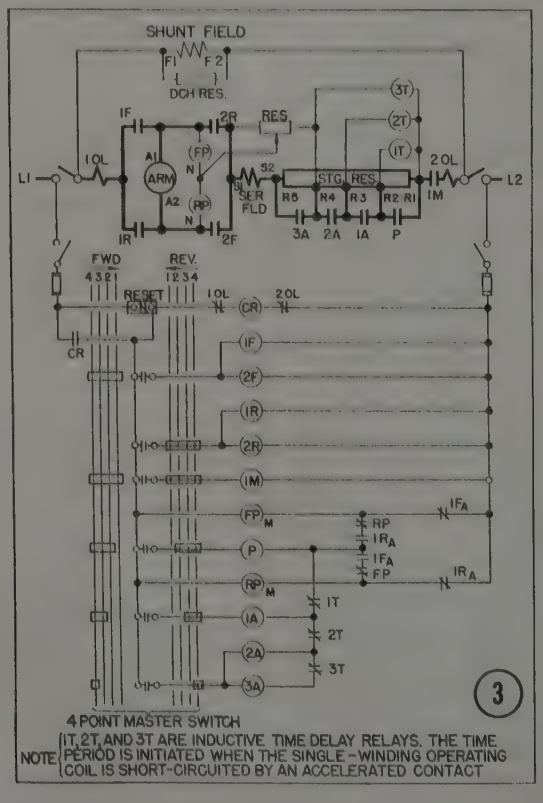
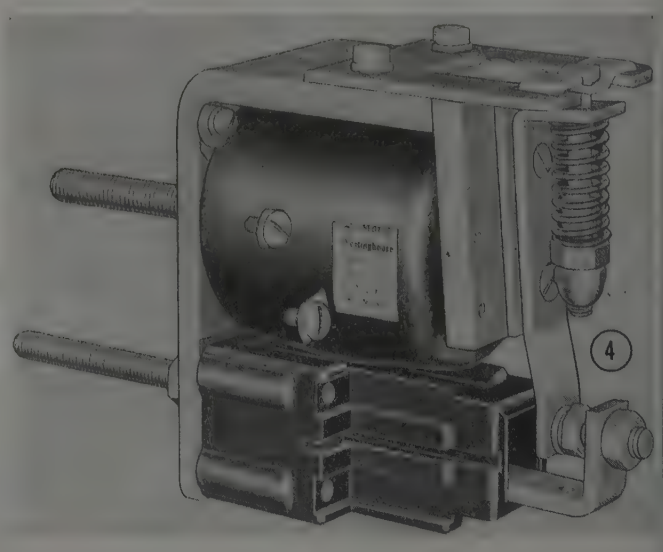


Fig. 3—Schematic diagram for a typical plugging reversing controller

Fig. 4—Typical rear connected magnetically-operated plugging relay with one normally closed contact



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GATX GENERAL AMERICAN

Engineering News *at a Glance*

ADD 3 TO 5 TIMES MORE SERVICE: Stainless steel spinning wire for telephone cable suspension in highly corrosive atmospheres was reported recently by a mid-western manufacturer of cable spinning equipment. It is said to assure substantial savings—lasting 3 to 5 times longer than heavily-coated wire formerly used where corrosive conditions are severe. Beside savings gained from the stainless wire, the makers say installation costs are cut 20 per cent by a lashed method of telephone cable suspension. In the company's method of spinning, according to American Rolling Mill Co., telephone cable is tightly lashed to the supporting strand by means of helically-wound wire.

GAGES GAS HEAT: Complex math formulas by which engineers learn the temperature of exploding gases in engine cylinders are solved quickly and accurately by an electronic computer invented recently by mechanical engineers at the University of Wisconsin. The device plots on an oscillograph the temperature of an explosion or series of explosions. Then the oscillograph is photographed every few seconds by a special camera for permanent records. The device was developed as a scientific accessory to the electro-optical pyrometer which gages the temperature of exploding gases within the cylinder of an experimental diesel engine. The latter, also developed at the university, is believed to be the only instrument of its kind in existence. It's actually an electronic thermometer.

COUNTERACTING FORCES: Whenever mechanical properties of nickel plating, such as tensile strength, hardness, etc., are sufficient to counteract the pulling stresses and the other internal and external forces acting on the plating film at any one point, peeling is prevented, according to a report prepared by Edmund R. Thews, a German consulting engineer, for the Office of Technical Services, Washington. Where this is not the case, he states, cracking of the film is bound to be induced, especially if the additional force of adhesion is unable to maintain the deposit in its place. Common external influences tending to overcome the tensile strength of deposits are bending stresses, cuts or cracks in the film, pores or similar surface faults, knots and trees on the surface of the deposits, sharp edges or corners under the film, and reduction of the original degree of adhesion by corrosion effects, the report states. The engineer also emphasizes harmful effects on nickel plating of organic and metallic impurities in the electrolytes, hydrogen absorption, excessively high or low hydrogen ion concentration, excessive concentration of organic acids and certain faulty degreasing techniques.

LONG SURFACE PROTECTION: Some 20 years of protection to ferrous metals against all common corrosive forces is provided by a process, called Zincilate, reported by Industrial Metal Protectives Inc., Dayton, O. Already tested on pipelines, interiors and exteriors of water and gasoline tanks, bridges and machine parts, the one-application coating is to be produced initially by Industrial Metal Protectives Corp. of Virginia, Newport News, Va., an affiliated company. The development is reported to possess remarkable abrasion resistance. Even when sizable areas are destroyed by scraping, lasting protection is assured through cathodic sacrifice of the film. The product also is unaffected after 1000 hours exposure in standard salt fog corrosion equipment as approved by ASTM. Negotiations are now underway to manufacture the coating commercially at various strategic points in the United States and abroad, according to the company. Fundamental research, laboratory development and management services in connection with the development were conducted by Commonwealth Engineering Co., Dayton, O.

LIGHTER-WEIGHT MOTORS: A new 35 per cent cobalt, 64 per cent iron and 1 per cent chromium alloy that is reported to carry more magnetism than any other alloy practical for use in motors and generators, was developed recently by Dr. Trygve D. Yensen of Westinghouse research laboratories in collaboration with J. K. Stanley. The metal will make possible compact electric motors and generators an estimated 10 per cent smaller and lighter than those of equal power now built for aircraft. The new alloy, called Hiperco, is the result of 20 years' research. Its final difficulty of brittleness was overcome only recently through a method of rolling that enables the production of a tissue-thin strip of metal tough enough to withstand intense vibration, yet ductile to the point it can be bent double without breaking.

MAKES STRAIGHT LIFT: In Schenectady, N. Y., it was learned, General Electric engineers recently developed a new motor and control system for a vertical-lift bridge—to be erected over the Passaic river in New Jersey—which is expected to provide an improved method of accurately maintaining alignment of the 222-ft span as it is raised and lowered. The system is said to be capable of raising the 2,750,000-lb structure 100 ft in 1¾ min, and will begin to correct span skew automatically if alignment is out as little as ½-in.

DOUBLE-BARRELED RESULTS: Two years' spare time designing and building tiny model components not only won for him Goodyear's maximum suggestion award of $1500, but also is enabling Engineer Chester F. Smith's company to duplicate for the first time in exact miniature, huge, complex belt conveyor systems—some of which run for miles cross-country and underground. Constructed to 1/16-in. scale and powered by a small 60 rpm motor, the minute parts include idlers, framework, belting, counterweights and a small stand of tires to cushion the loading impact. The models can be used for testing new belt designs and as visual aids for training field representatives.

JOINS STRIP "ON THE FLY": End-joining strip steel coils of various widths is reduced to a button-pushing job by a special magic-eye controlled double roll seam welder produced recently in the plant of Thomson Electric Welder Co., Lynn, Mass. The unit is designed for high speed joining of coils where an overlapping joint is not objectionable, but where speed in linking coils of varying width is highly desirable. In continuously processing coils, they must be joined during the brief interval gained by running off slack from the paid out end of the old roll. Where considerable time is required for making the weld or adjusting for weld width, an arrangement such as a looping pit must be provided. All this is eliminated by the performance of the special welder which literally joins the coils "on the fly". A simple electronic timing device automatically handles adjustment for the various widths.

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RADAR EQUIPMENT TO BENEFIT

Lake Vessel Operation

Radar scope pins down objects in ranges of 100 yards to 32 miles and gives accurate bearing information. Device makes possible more round trips and more frequent loading and unloading of vessels

VESSEL movement of iron ore and coal on the Great Lakes this coming season will be aided considerably by more extensive use of commercial marine radar equipment. Installation of radar units on iron ore carriers will not only make possible completion of more round trips per vessel throughout the season, but will afford greater safety in navigation under adverse weather conditions. More accurate scheduling of loading and unloading vessels also should result through greater use of this equipment.

At the close of the war the United States Coast Guard started a campaign to interest ship owners and electronic equipment manufacturers in the use of radar designed specifically for commercial marine shipping as a navigation aid and as an obstacle detector.

Quick to realize the advantages of such a navigation aid, the Great Lakes Carriers' Association established a radar operational research project. The consulting engineering firm of Jansky & Bailey were retained to assist in the planning and execution of this project. Various manufacturers and prospective manufacturers of commercial marine radar equipment were invited to participate in this Great Lakes radar operational research project. By a drawing of lots, six trial installations were assigned as listed in the accompanying table.

All of the six vessels tabulated are bulk cargo freighters. The Geo. F. Rand is of the self-unloader type. The other five are used primarily for carrying iron ore and are typical of the iron ore fleet which performed yeoman service to the steel industry during World War II.

The Wm. G. Mather, with a total overall length of 618 ft, beam 62 ft, depth 32 ft, and gross capacity of 13,500 tons, is typical of this fleet which travels at a speed of 11 to 13 land miles per

Fig. 1 (above)—Scope covers Belle Isle bridge which is apparent at 320° just beyond the 1-mile range circle

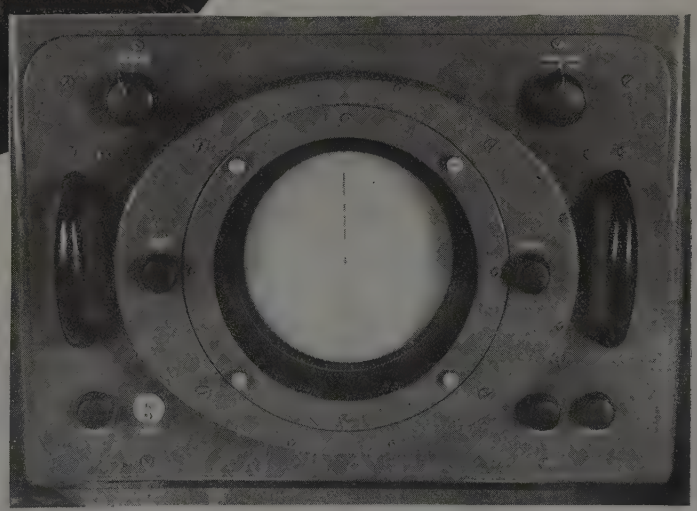

Fig. 2 (right)—Indicator scope, with ship in center, provides continuous picture of ship traffic and shoreline conditions from 100 yards to 32 miles of vessel

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Other suggestions may include the use of safety guards on machines; proper work clothes; safer working procedures; changes to eliminate occupational disease; establishment of first aid departments.

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SIX BULK CARGO FREIGHTERS SERVED BY RADAR UNITS

Ship Operator	Vessel	Captain	Radar Manufacturer
Boland & Cornelius Ray T. Carter, Marine Supt.	Geo. F. Rand	Even Solbert	Raytheon Mfg. Co.
Cleveland-Cliffs Iron Co. C. O. Rydholm, Marine Supt.	Wm. G. Mather	A. J. Rathbun	Westinghouse Electric Corp.
Hutchinson & Co. John Rutledge, Fleet Capt.	C. H. Hutchinson	Harold Jacobsen	Western Electric Co.
M. A. Hanna Co. A. B. Kern, Manager of Fleet	E. T. Weir	A. H. Hartman	General Electric Co.
Pickands, Mather & Co. T. F. Zealand, Marine Supt.	Frank Armstrong	H. Chesley Inches	Sperry Gyroscope Co.
Pittsburgh Steamship Co. R. M. Crawford, Fleet Capt.	A. H. Ferbert	Frank Davenport	Radiomarine Corp. of America

hour with a draft of approximately 22 ft. Some lake freighters are large and some are small, but all require careful handling in a service where traffic is heavy and much of the time close to shore, in channels, or entering and leaving port. Added to the normal hazards of converging channels and closein navigation is the problem of fogs and inclement weather.

Captains of these trial ships were quick to realize the advantages of this navigational aid and soon became proficient in its use. Some of the results have been most interesting.

The captain of one radar equipped vessel kept a record of time saved by the use of his radar, during the last two months of the past season. He had saved 40 hours of delay which at $100 per hour represented a $4000 saving. Based on ship to ship radio reports, this represents only that time when a nonradar equipped vessel in his vicinity would have been forced to drop anchor and wait for the fog to clear.

Results under conditions of rain squalls and snow storms likewise were most interesting. Captain A. J. Rathbun of the Wm. G. Mather, equipped with Westinghouse marine radar, reported his experiences on one such trip as follows:

"It was snowing hard. At times we could see the lights on the SAMUEL MATHER but most of the time visibility was a mile and frequently much less. Our radar was working beautifully—as well as I had hoped for and much better than I had anticipated.

"We cleared Duluth the evening of Nov. 20 and had a good run down until we passed Manitou Island about 4:30 p.m. Nov. 21, at which time we encountered a heavy sea from about S.S.E. and we had to steer 130° on our Gyro to keep from rolling hard. That same evening about 9:30 p.m. we got a sudden wind shift to west northwest, blowing hard and accompanied by blinding snow. At this time the steamer SAMUEL MATHER was just a little aft of our port beam, about 2 miles, or to northward of us and the steamer PIONEER was on our starboard quarter and about 2 to 3 miles astern. The weather predictions were for northwest gales with snow and all indications were that the wind would shift to northeast. We all started to work out to the northard and did get out to the regular down bound course and then hauled down to 115° on the Gyro for White Fish Point, and just about the time we hauled down the wind backed up to about west southwest and by 11:30 p.m. there was a terrific sea from about west southwest.

"We stayed in the pilot house all night and spotted targets, 'upbound ships,' as soon as they came into the 8-mile range on the P.P.I. scope. Then by radio telephone I would warn the SAMUEL MATHER and the PIONEER of their approach and could tell them exactly their angle of approach and distance away.

"About midnight I received a ship call from the steamer W. H. McGEAN. The captain told me that the McGEAN, the FARRELL, and some other ships were all down bound behind the PIONEER, that he had heard me give warnings to the other ships and requested me to do the same for them, which I agreed to do. But after midnight we did not meet any more upbound ships. I think they were all seeking shelter under White Fish Point."

These trial installations have shown that a well designed 3-cm wave length marine radar is best suited to the navigational needs on the Great Lakes. Trials during the past season have demonstrated that such sets properly used and provided with means for receiving "Raymark" beacons should meet the navigational needs on these important inland waterways. While "Raymark" beacons were not in operation during the past season, trial installations on the Great Lakes are contemplated. Their use is proposed to strategic locations where the shore line is so regular that identification of individual points is difficult. Such markers may also prove to be useful in identification of lighthouses at points where ships may be lying at anchor.

These trials have demonstrated that the essential features of a commercial marine radar for Great Lake service are as detailed below:

In the open lakes, detection of a ship of medium or large size at a distance of 8 to 10 miles gives adequate warning for the prevention of collision.

While not originally contemplated, a well-designed radar will be used a fair percentage of the time for position finding when a ship is 15 to 30 miles from shore. To meet the requirements of this use, the radar pulse power must be sufficient to give a range of 40 miles when propogation conditions are favorable. A narrow beam width for accurate determination of bearing and marker rings for accurately estimating distance are also required for this use.

For navigation in the rivers and confined waters, the radar should pick up typical lighted buoys at distances up to 6 miles and unlighted standard metal buoys at 4 miles under normal conditions. A high degree of resolution is required to show harbor entrances. Standard unlighted buoys 300 ft apart should show as separate buoys at distances of 1 to 1½ miles. A minimum range down to 300 ft is also necessary for safe navigation in confined waters.

Steel Hub Shells Broached At Rate of 630 Per Hour

With an operator merely roughly locating each of four steel bicycle coaster brake hub shells on a vertical pull-down broaching machine, as high as 630 pieces per hour may be processed with one pass per piece. Three splines, each 0.290-in. wide by 0.123-in. deep by 2 in. long, are broached in the hubs, which are made of SAE 1112 steel.

Once located, the machine, a type XP-30 x 54 in. model, made by Oilgear Co., Milwaukee, is started by two start buttons, and the descending tools automatically centralize the hub shells. They are automatically ejected into separate troughs equipped with guides to make them roll out quickly. Chutes extend out the left side of machine for connection to a conveyor system.

New Cutting Tool Patented

A new cutting tool patented this year by John R. Raper, Los Angeles, is said to have an improved torsional factor whereby the chips travel upwardly and outwardly in a smooth and uniform manner. Tool reportedly reduces the number of cutting operations by virtue of the fact that it is capable of cutting larger chips. The tool bears the patent No. 2,392,001.

The new induction heating method of producing heat treated quenched and tempered cold finished steel makes possible an unusually accurate control of the process. Bars are fed individually through the coil and heated to exactly the desired temperature. They pass immediately through a cone of water sprays which is used to closely regulate the cooling. The Electreat cold finished bars produced by J&L with this process have a degree of uniformity not possible with conventional methods. Write for complete information.

J&L STEEL

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Casting Design

(*Continued from Page* 91)

it also removes sand from rough, unmachined and interior surfaces. Brazed barrels are uniform in thickness and completely separated by water.

The design shown in Fig. 4 insures adequate support for the "deck"; this is in contrast with the "deck" support obtained in an L-head engine with removable wet sleeves. It is not known that L-head blocks, as shown in Fig. 4, have yet been produced, even experimentally, although the design has been under consideration since the latter part of 1945.

Silver brazing and bronze welding offer possibilities for the production repair of defective and porous gray iron castings. Where porosity only is encountered and the casting does not attain more than 300° F in service, sealing with soft solder, babbitt or other low melting point alloys can be used, and is readily accomplished by dipping if the casting is fairly small and of simple contour.

Some designers are doubtful of silver brazed joints in gasoline engine cylinder parts which are exposed directly to flame. As long as the parts are cooled directly with water there would seem to be no sound reason to fear the effects of cylinder temperatures upon silver brazed joints, since the melting points of silver brazing alloys are not far from those of the aluminum alloys which are used successfully for both air-cooled and liquid-cooled gasoline engine cylinders. While silver brazing of cylinder components seems practical, it does not appear applicable to cast iron exhaust manifolds, which often reach temperatures of 1300° F or more in service.

Silver brazing of gray cast iron in production is best accomplished by methods susceptible to automatic control, such as furnace brazing or induction heating. For assemblies of relatively low weight but large overall dimensions, such as oil or induction manifolds composed of assemblies of steel tube and relatively light iron castings, torch brazing may be an attractive alternative. In fact almost all production applications of silver brazing of cast iron to date have been of this type.

The author was responsible for the design of the cylinder assembly shown in Fig. 5. The barrel section casting of this unit shown in Fig. 7 proved to be difficult to cast, and while several foundries agreed to try it, they failed to produce castings which were liquid tight. The author, who has had some years' experience as an iron molder and many years' experience as a casting designer, reviewed the barrel design and came to the conclusion that despite foundrymen's remarks as to its being easy, it could be worse from the foundry standpoint, but not much.

Extensive studies of alternative one-piece barrel castings failed to suggest a simpler alternative to that shown in Fig. 7. A simpler one-piece barrel casting could have been evolved by complete revision of the cylinder head design. The head design was, however, satisfactory for the difficult and severe duty involved, and in any case standardized use for military purposes practically eliminated complete redesign as a possibility. Finally it was decided a 2-piece casting was the solution to the difficulty and a jacket casting held by silver brazing to a cast iron tube, forming the bearing for the piston, was chosen.

Further consideration led to the conclusion that assembly of the cast iron tube to the jacket section by a mechanical joint was preferable, and the design shown in Fig. 6 was evolved, constructed, and has since been standardized. The new design not only obviates the casting difficulties of the previous drawings but is much more satisfactory in respect to performance and economy of operation. The improvements in performance and economy of operation in this case are, however, secondary to the improvements from the foundry standpoint.

The design also had the considerable wartime advantage of allowing remachining of finished castings of the design shown in Fig. 5. The redesign, of course, required a considerable change in the cooling water circuit. The engine in which the (Fig. 6) design is used has no slight limitations. Limitations of cost apply to operation only rather than to those of initial investment. If weight limitations were necessary, a design anchoring the cast iron tube to the jacket casting at one or both ends would have been preferable to the heavy flange construction shown in Fig. 7.

Simplification of castings by the use of brazing and mechanical assembly of simpler components is not confined to gray iron castings. Silver brazing of copper alloy cast components is a simple proceeding, with wide possible applications, and aluminum brazing of cast and wrought aluminum alloy components is highly developed but is somewhat neglected by the casting designer.

Silver brazing as a production method often is viewed with disfavor by purchasing departments since the cost of silver alloys is often about ten times that of 60-40 copper-zinc spelters, which seem to the purchasing department to perform the equivalent purpose. If it is assumed that production brazing must be performed at about 150° F above the flow point of the brazing alloy—and this must be assumed for safety—the minimum operating temperatures for silver alloys and copper-zinc spelters then become about 1325° F and 1800° F respectively. The lower working temperature of the silver alloy usually means the assembly will not need remachining to true up warpage.

A brazing temperature of 1800° F for a complex iron casting is often not allowable due to distortion, apart from softening effects and deterioration of bearing properties. Apart from warpage, the additional costs of heating to 1800° F rather than to 1325° F are considerable. Furthermore, the amount of alloy required to make a joint is usually much lower with the silver alloys than it is for 60-40 alloys. Beyond the additional costs of heating to 1800° F rather than to 1325° F, there is the higher cost of furnaces for heating to the higher temperature. While the silver

WARM DOUGHNUT: Doughnut-shaped rotary furnace, designed by Rust Furnace Co., Pittsburgh, utilizes the counter-flow principle of heating, reduces heat at center of doughnut hole and is said to save 50 per cent on fuel consumption. Cylinder in the center foreground is one of the waste gas outlets leading from the furnace to the stack. Similar outlet is located directly opposite, inside furnace hole

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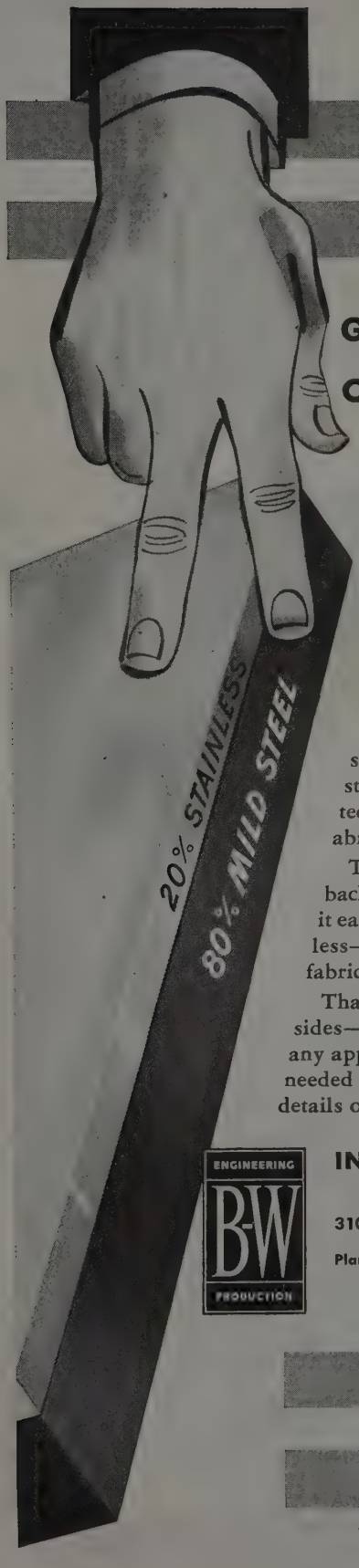

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alloys seem most desirable for furnace brazing or induction heating, the 60-40 alloys appear to have wide application for torch brazing of many gray iron components.

This discussion deals largely with the experimental phases of silver brazing gray iron, and this is largely explained by the fact that practical application of the process is less than 2 years old. However, the process has been applied on a relatively large scale of some high-speed internal combustion engine components. Fig. 6 shows components several thousand of which have been produced.

In silver brazing, the use of preplaced inserts of the brazing alloy appears to be much the most desirable method, whether heating is to be accomplished by furnace, induction or torch. Preplaced inserts reduce the amount of alloy required and the skill necessary to perform the operation, in addition to being virtually essential for furnace brazing.

In silver brazing an assembly of components into a gray iron casting the thermal expansion characteristics of the components must be considered. Assemblies of gray iron, malleable iron, cast or wrought ferritic or martensitic steels can be produced successfully. If some of the inserts or parts forming the assembly have a much higher coefficient of thermal expansion than gray iron, brazing may be virtually impossible if the inserts are of considerable dimensions. Thus, it would not appear to be possible to silver braze successfully a 3-in. diameter seat insert ring of bronze, or 18-8 chrome-nickel austenitic steel into a gray iron globe valve body since the differential expansion between ring and body from room to brazing temperatures will be of the order of 0.013-in. While bronze and 18-8 steel are unsuitable for this purpose a straight chrome (11 per cent or more) steel would appear suitable as regards expansion characteristics, and also silver brazes fairly readily with a suitable brazing alloy.

ACKNOWLEDGEMENT

The author acknowledges the considerable assistance of R. F. Broquet in the preparation of this article.

Movies Depict Various Aspects of Special Steels

Seven technical films depicting some aspect of special steel production, use or fabrication are being offered for free showings to trade and lay audiences by Allegheny Ludlum Steel Corp., Pittsburgh. The 16 mm sound films are in color, and black and white. Their showing times varying from 10 to 30 min. A leaflet describing the films and detailing the booking arrangements is available from the company.

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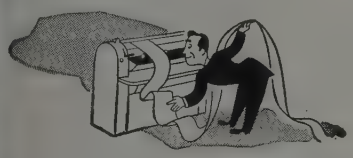

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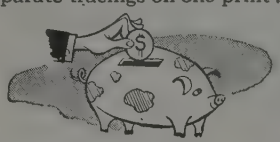

claim old or worn tracings . . . make transparent overlays in different colors.

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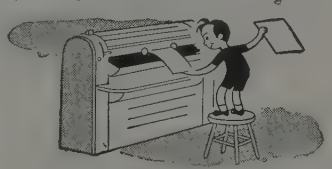

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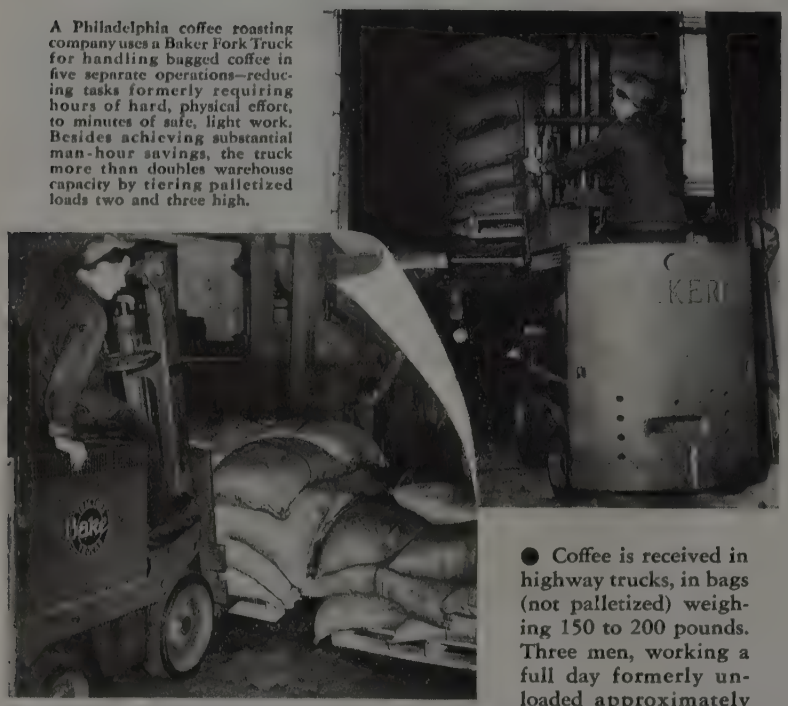
A Philadelphia coffee roasting company uses a Baker Fork Truck for handling bagged coffee in five separate operations—reducing tasks formerly requiring hours of hard, physical effort, to minutes of safe, light work. Besides achieving substantial man-hour savings, the truck more than doubles warehouse capacity by tiering palletized loads two and three high.



● Coffee is received in highway trucks, in bags (not palletized) weighing 150 to 200 pounds. Three men, working a full day formerly unloaded approximately 750 bags and piled them in the warehouse. Today, one operator with the Baker Truck, could easily unload 2500 bags. The truck first lifts the empty pallets onto highway truck from floor level. After bags are placed on pallets, the fork truck unloads and tiers the palletized units in the nearby warehouse area.

Since only a fraction of the truck's time is required for unloading and tiering, it is free to transport pallet loads of green coffee, in correct proportions for the desired blend, and spot them alongside the roasting station. This operation formerly took the *full time* of one man. Roasting completed, coffee is weighed off in 80 lb. bags and again palletized, so that the truck can move them either to temporary storage or load them directly into vehicles for shipment.

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Baker INDUSTRIAL TRUCKS

Rare Metals

(*Continued from Page* 94)

Westinghouse research laboratories.

The method used is essentially the reduction of zirconium chloride with magnesium. The starting material is zirconium oxide which is converted to carbide by heating with carbon in an electric furnace. Zirconium carbide thus formed is chlorinated yielding zirconium chloride. The chloride is heated in specially designed equipment and the vapors react with magnesium, forming a mass of spongy zirconium and magnesium chloride. Excess magnesium and magnesium chloride are removed by vacuum distillation and the zirconium metal melted in an arc furnace under purified helium gas. The process is ingenious although somewhat complicated and requires considerable equipment. One of the important contributions of Kroll has been the fabrication of large pieces of zirconium weighing up to 1 lb.

Advances in the technology of zirconium production by reduction methods involving oxides, chlorides or fluorides with the alkalis or alkaline earth metals, have been for the most part improvements in equipment design rather than basic changes in methods. It has been customary in the past to perform these reductions in heavy-walled equipment referred to as bombs. Using this method, the bombs were closed with ground-in stoppers. Thermal warping of the parts during reduction necessitated grinding in stoppers for each run. Furthermore, gas conditions within the bomb during heating and cooling were unpredictable.

In recent years, simplification in equipment design has resulted. The possibilities of such improvements may be found in a study of some of the reactions involved. Thus, in the reaction of oxides with either calcium or magnesium, the only volatile components are calcium or magnesium metals, which exert relatively low vapor pressures at temperatures of 1000 to 1200° C. This vapor pressure may be further depressed by inert-gas filling so that these reactions may be conveniently performed in thin-walled containers of Vycor glass. Equipment for this type of work has been designed and is being used.

From the powder stage, compacts of zirconium may be formed readily by hydraulic pressure in hardened dies at 40 to 50 tons psi. These compacts are very strong and may be easily handled. They may be sintered in high vacuum or melted on a suitable refractory. In sintering zirconium, a vacuum to 10^{-3} millimeters or better is required to prevent appreciable hardening of the zirconium lattice.

Work on zirconium in the past two

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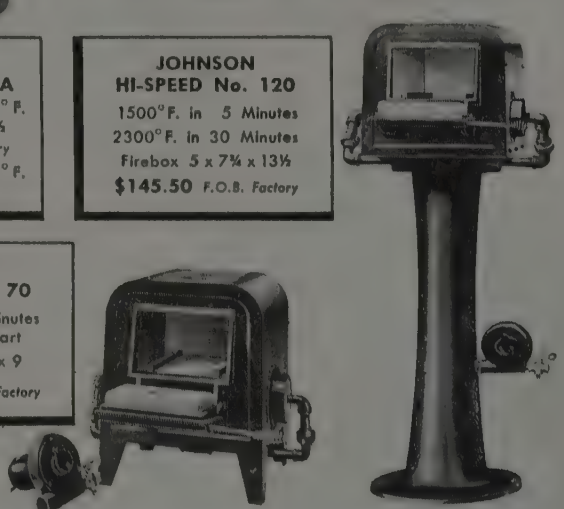

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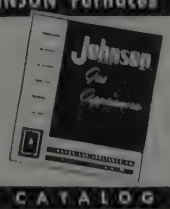


WRITE FOR COMPLETE JOHNSON CATALOG

years at the Westinghouse laboratories has produced a nonpyrophoric powder having the following average analysis: Carbon 0.02 per cent, silicon dioxide 0.02 per cent, iron 0.04 per cent, calcium 0.05 per cent, and titanium 0.0 per cent. Sintered zirconium compacts have been produced with a hardness of vickers 183 (rockwell B 90) which may be easily machined, tapped and drilled. Zirconium has been melted in 30 to 50 gram melts—this material is harder than sintered zirconium but can be machined, tapped and drilled. Ultimate object of this work is the production of cold ductile zirconium. It was disclosed that the course of most experimenters at the present time is along refinements in techniques rather than in basic change in process.

Uranium Production: At the time quantity production of uranium was first proposed, Westinghouse laboratories had experience with the two processes which could be used. The availability of raw materials and the purity of the product were primary considerations in deciding which process to apply. It was pointed out that the purity requirements of the metallic uranium for atomic power experiments were very rigid. For example, it was very important to have certain common (wide spread) elements such a boron as low as 1 part per million. Thus, it is apparent that very pure raw materials were required.

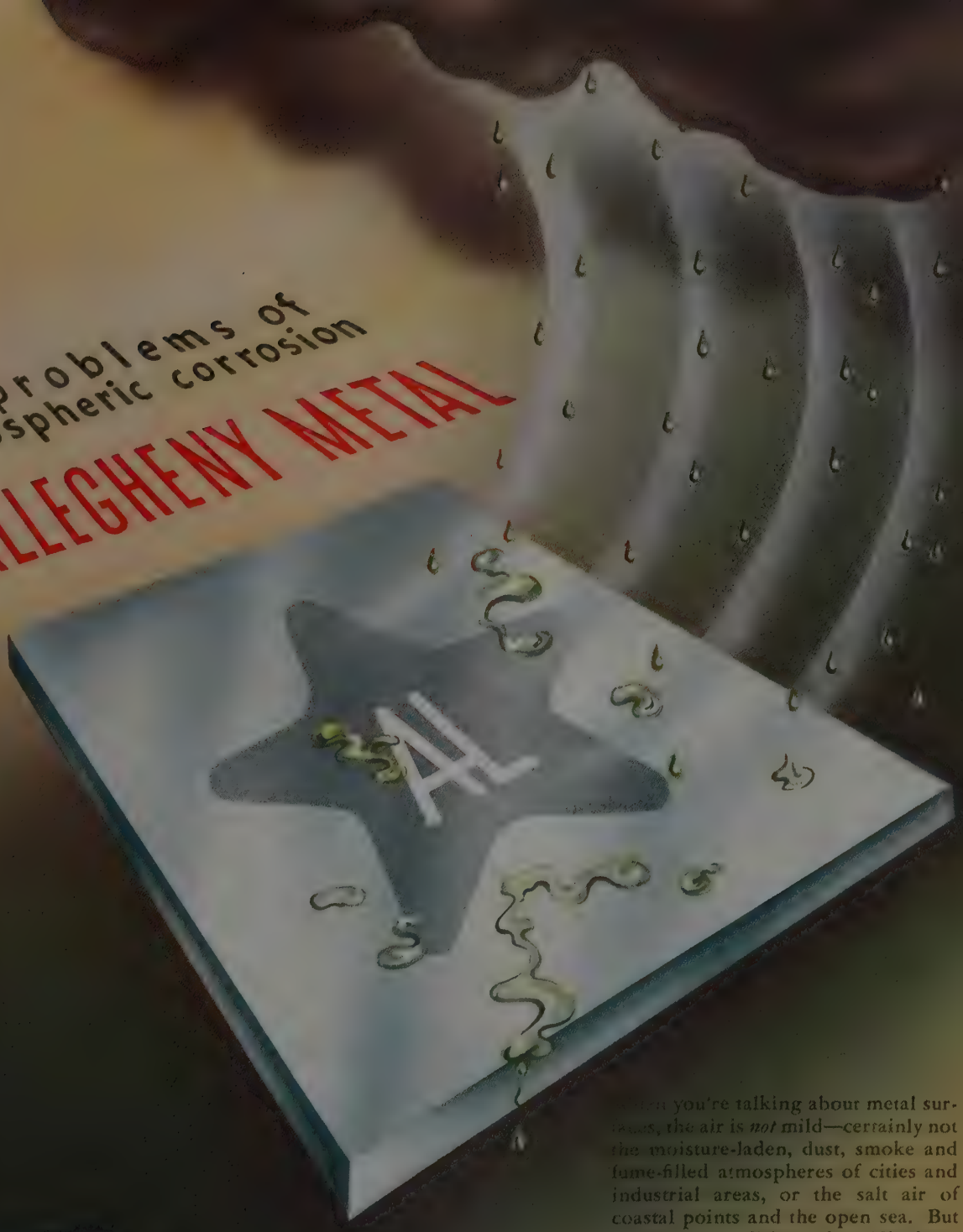
First process for uranium production comprised the reduction of uranium oxides with calcium or sodium and a calcium chloride flux in a closed bomb. The second method available for production of high purity uranium involved electrolyzing KUF_5 in a fused mixture of sodium chloride and calcium chloride. The KUF_5 was prepared by photochemical reduction of a solution of uranyl nitrate. The metal powder was fused in vacuum, and the product analyzed 99.9 per cent metallic uranium.

The calcium reduction process used either uranium oxide or fluoride, calcium metal and calcium chloride. The best uranium compound available in quantity at that time was recrystallized nitrate. This could be ignited to the oxide or photo-reduced and precipitated as the double fluoride. Ignition to the oxide was, of course, the simpler process but the photochemical reduction was a very desirable purification step. The calcium reducing agent was the stumbling block in the bomb reduction. At the time commitments were being made early in 194 it was reported that no quantity supply of redistilled high purity metallic calcium was known. The use of the electrolytic process was, therefore, dictated.

The electrolytic method required uranous fluoride, which Westinghou

r problems of
tmospheric corrosion

ALLEGHENY METAL



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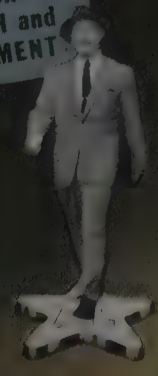

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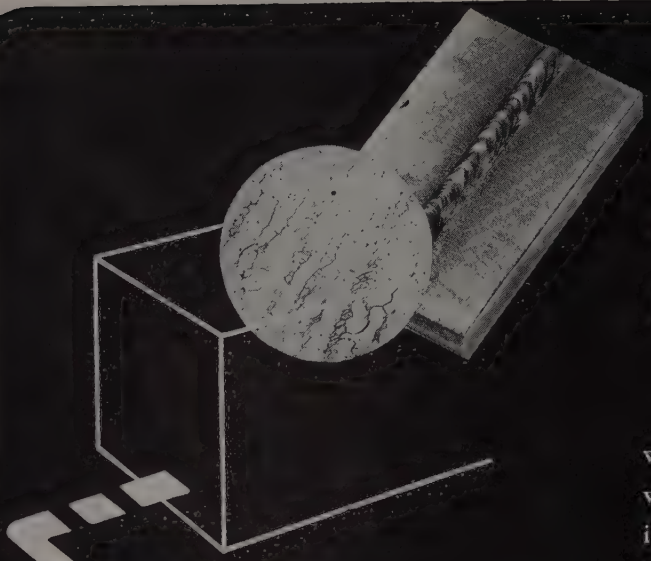

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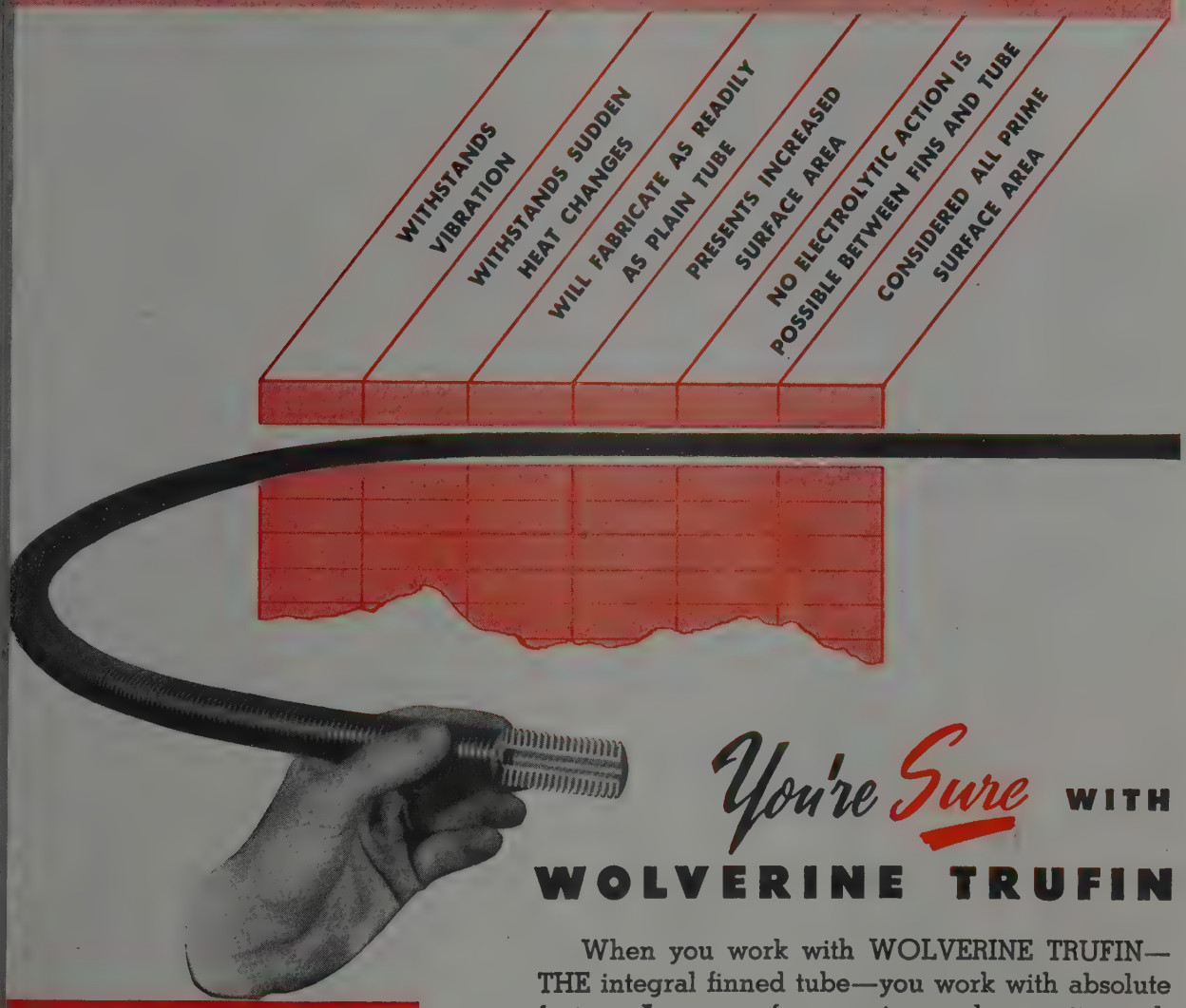
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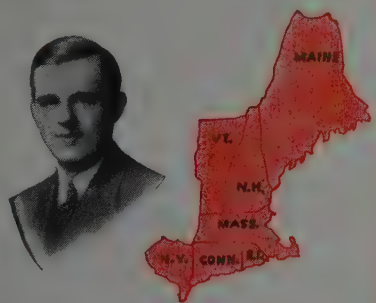

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had had experience in making in fairly pure form and calcium chloride and sodium chloride, both of which were obtainable in high purity from chemical manufacturers. The process as originally worked out consisted in fusing a mixture of calcium chloride and sodium chloride plus a small per cent of KUF_5 in a graphite crucible at about 800° C. The crucible became the anode of a cell with a molybdenum strip suspended in the center as cathode. As current flowed through the cell, the uranium was deposited on the cathode as a loosely adhering matrix powder admixed with bath salts. The salts prevented oxidation when the electrode was removed from the bath and cooled. The deposit was chipped off, crushed, washed with water, ground wet, and washed again. The metal powder was filtered, dried in vacuum, pressed into pellets and fused in vacuum.

The powder also could be sintered below its melting point, but because many volatile impurities were removed and the oxide was separated during vacuum fusion, the extra effort was believed worthwhile, in fact essential. In this respect, uranium is different from thorium or zirconium.

First uranium metal powder was made in crucibles which produced about 10 grams of metal powder each run (30 min) in a vacuum apparatus. Fused pieces weighing 20 to 30 grams and of approximately the size and shape of a cashew nut were obtained.

The first order for the metal for use in atomic energy experiments which came to Westinghouse in December, 1941 was for 10 kg. This seemed to be high quantity at the time. This first order was filled by using two small laboratory furnaces, a few wooden tubs on the roof utilizing sunlight for the photochemical reduction and a somewhat larger vacuum melting apparatus. For the most part, the 10 kg was supplied in a wide variety of shapes and sizes for the use of physicists who were making measurements and calculations for the plutonium piles. Articles varied from cast spheres with pipes through the center, to spirals of square wire and many others which taxed the ingenuity of the men and the facilities of the laboratory.

The step to larger production was for the most part, according to the Westinghouse men, one of multiplication of the laboratory set-up. There was no time for extensive development of cells and photochemical reduction apparatus and vacuum furnaces. The sizes of all units were increased as much as was deemed necessary and thereafter greater production was attained by adding more units. Improvements in the process were made. The material efficiency of the cells in-

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WILKES-BARRE, PA.—Tests prove that wire rope slings having hand-spliced or clipped loops seldom develop full rope strength. Slings with doubtful safety factors are likely to menace men and equipment. Therefore, general practice has required use of heavy zinced sockets to assure safety. The Acco-Loc Safety Splice develops the full strength of the wire rope and yet weighs no more than a well-made hand splice.

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creased from approximately 40 per cent to 80 per cent. The KUF_5 was replaced by uranium tetrafluoride made by hydrofluorination of the oxide and dependence of the process upon the weather disappeared. This uranium tetrafluoride was produced from uranyl nitrate purified by ether extraction and was of a purity seldom achieved even on a laboratory scale.

Success of the Westinghouse electrolytic method in producing uranium for the Manhattan Project can best be evaluated by quoting from the Smythe report, "At the end of 1941 the only uranium metal in existence was a few grams of good material made on an experimental basis by the Westinghouse Electric Corp. and others, and a few rounds of highly impure pyrophoric powder made by another company". Dr. Smythe goes on to note that the KUF_5 production constituted a potential bottleneck and that steps were taken to make the uranium tetrafluoride available. "As a result of this supply of raw materials to Westinghouse, and as a result of plant expansion, deliveries from Westinghouse had accumulated to a total of more than 6000 lb by November, 1942. The purity of the metal was good and the cost had dropped to $22 per pound." Production reached an average of 500 lb per day by January, 1943 and totaled about 75 tons before this manufacture was discontinued in the fall of 1943. Costs of course, decreased still further.

That the Westinghouse process was superseded by a simpler and cheaper one is not to the discredit of the electrolytic process. Late developments of a radical nature in the electrolytic process indicated that it could be greatly simplified but the changes were never applied on a large scale. The important contribution of the electrolytic method lies not in the tonnage of metal produced, but in the fact that small quantities were supplied for the very first experiments on atomic energy. Thus, the process served well for the first production of uranium and its application saved many months of precious time.

Patent Granted for Impact Tool with Great Strength

An impact mechanism such as an impact wrench which is accelerated so that it is possible to deliver a greater force is the subject of patent No. 2,408,228, granted to Carroll H. Richards, Boston. The tendency to distort the hammer surface is overcome by maintaining the same of angle of impact between the hammer and the anvil face. Other reported advantages are that it absorbs the reaction of impact within itself, and that it is capable of being driven by other than pneumatic power if necessary.

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DYNAVIS OILS — Low pour point inhibited oils which help prevent formation of harmful corrosive and sludge-forming acids. Well-suited for engines fitted with alloy bearings and operated at high temperatures.

SUNTAC OILS — 100% petroleum products which have been treated to increase their adhesiveness. Recommended for general lubrication in all industries where sudden shocks and reversal of loads take place. These oils cling to the parts to be lubricated.

CIRCO OILS — Used for general lubrication of industrial machinery when straight mineral oils are required.

SUNISO REFRIGERATION OILS — Have extremely low pour points and long life stability characteristics. Initially neutral and resistant to formation of detrimental acids under service conditions. The most outstanding oils in the refrigerating and air-conditioning fields.

STEAM CYLINDER OILS — High flash and fire point lubricants for either saturated or superheated steam conditions and for worm gear speed reduction units.

SUN CAR JOURNAL OILS — Dark oils meeting A.A.R. Specifications. For use on railroad cars and waste-packed bearings of railroad equipment.

SUN DELAWARE OILS — Dark oils for general lubrication on older type industrial machinery.

SUNOCO WAY LUBRICANT — Has good metal-wetting and adhesive properties, ample viscosity and E.P. qualities. For use on tableways, as it eliminates chatter and scoring . . . resists corrosion.

SUN MARINE ENGINE OILS — Compounded with special emulsifying agents in order to provide adhesion to and lubrication of working parts in the presence of water. For the lubrication of bearings, eccentrics, cross-heads and various other parts of steam engines.

ROCK DRILL OIL — Heavy-duty adhesive type oil. For use in jack-hammers, stopers and drifters on heavy-duty mining operations.

SUNVIS 900 SERIES TURBINE OILS — High V.I., predominantly paraffinic oils, of uniform 0°F. pour points, containing additives to give high oxidation stability and corrosion resistance under practical operating conditions. Modern oils for turbine and hydraulic systems.

SUN INDUSTRIAL GREASES

SUN CUP GREASES — Water resistant. For grease cup and grease gun application when the service is not severe.

SUN GUN GREASES — Smooth greases made with medium viscosity oil. Stable under pressure in power guns or booster guns.

ADHESIVE PRESSURE GREASES — Won't drip or splash and are excellent lubricants for open gear applications.

SUN DARK PRESSURE-SYSTEM GREASES — For power-driven central grease lubricating systems in heavy industries. Can also be used as a "medium cup grease."

SUN MINE CAR GREASES — Available in several grades. Suitable for both anti-friction bearings and plain bearing cavity-type wheels.

SUN ROLLER BEARING GREASES — For use on electric motors and generators and other high-temperature machinery equipped with ball or roller bearings.

SUN GEAR COMPOUNDS — Black adhesive open gear compounds and wire cable greases. Recommended for open gears on metalworking power presses, mining machinery, old reduction mills, crushers, pump gears, etc.

SUN MINING MACHINE LUBRICANT — Semi-fluid. For use where a light but adhesive type grease is required. Free from separation or decomposition.

SUNOCO TRACTOR ROLLER COMPOUND — For miscellaneous parts of caterpillar or crawler-type tracks. Provides good lubrication with exceptional sealing qualities.

SUN METALWORKING OILS

SUNICUT — Straight or non-emulsifiable transparent cutting oils. Recommended for automatic screw machines and for heavy-duty machining operations.

SUN INDUSTRIAL

SUNOCO EMULSIFYING CUTTING OIL—A self-emulsifying oil which produces a stable white emulsion when mixed with water. Sunoco is an efficient and economical cooling and lubricating medium for turning, milling, drilling, and other metalworking operations on both ferrous and non-ferrous metals. It is also an excellent grinding coolant.

SUN QUENCHING OILS—Specially refined oils designed to develop maximum physical properties in a wide variety of steels.

SUN TEMPERING OILS—Specially refined oils for tempering steel up to 550°F. Due to their low carbon content and stability under heat, these oils have an unusually long service life.

SUN ROLLING OILS—Straight and emulsifying oils which will permit maximum production in rolling steel, aluminum and brass.

SUN ANTI-RUST COMPOUNDS—Petroleum base oils with chemical additives designed to prevent the rusting and corrosion of steel.

SUN PROCESSING OILS

SUNOTEX TEXTILE OILS—Designed to impart certain additional properties to various forms of fibers during their processing from the fiber state into a manufactured product. All Sunotex textile oils are emulsifiable in water.

SUN COTTON CONDITIONING OILS—Pale mineral oils which condition the cotton. They prevent waste by cutting down excessive amounts of "fly" or fine air-borne particles of lint.

SUN ASBESTOS FIBER CONDITIONING OIL—Used for spraying on the asbestos during processing. Fibers are not so readily damaged or broken down into harmful dust when this product is used.

SUN CORDAGE OILS—Are adaptable in various formulae used by cordage manufacturers. They are selected products which are highly compatible with additives.

CIRCOSOL—2XH (Rubber Processing)—An elasticator and processing aid for GR-S particularly.

CIRCO LIGHT PROCESS OIL (Rubber Processing)—A processing aid and excellent softener for natural rubber, natural rubber reclaims, and neoprene synthetic rubber particularly. Used for GR-S to some extent.

SUNDEX 53 (Rubber Processing)—An inexpensive product suitable for processing GR-S and blends of GR-S and natural rubber. An established outstanding processing aid for footwear rubber stocks.

CIRCOMAR-5AA (Rubber Processing)—A black colored product used in reclaiming natural rubber scrap. Used also as substitute for asphalt fluxes in processing natural and GR-S rubber. Free-flowing at room temperature.

SUN LEATHER OILS—Mineral base leather oils. Used for obtaining the desired tensile strength, proper temper and a controlled moisture content. They maintain a light even color . . . mix well . . . distribute evenly.

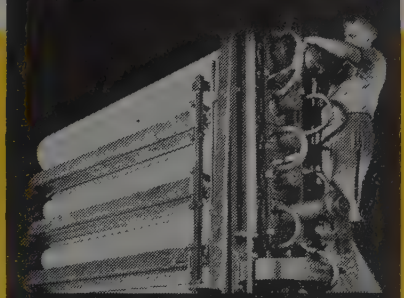
SUN MISCELLANEOUS INDUSTRIAL PRODUCTS

SUN SPIRITS—For the thinning of paints, varnishes, and enamels. Also for metal cleaning. This product is a pure water-white petroleum solvent and is free of corrosive sulphur.

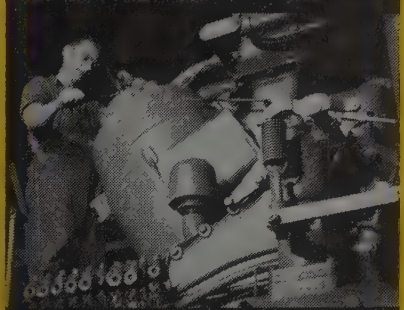
SUN WAXES—Used in packaging, sealing, coating, waterproofing and for numerous manufacturing and chemical processes.

RUBBER MANUFACTURER saved $3,000 a year with a Sun Processing Aid

ALUMINUM PARTS MANUFACTURER increased output 43% with Sun Cutting Oil.



PAPER MILL slashed annual lubrication bill $2,874 by using a Sun Grease.

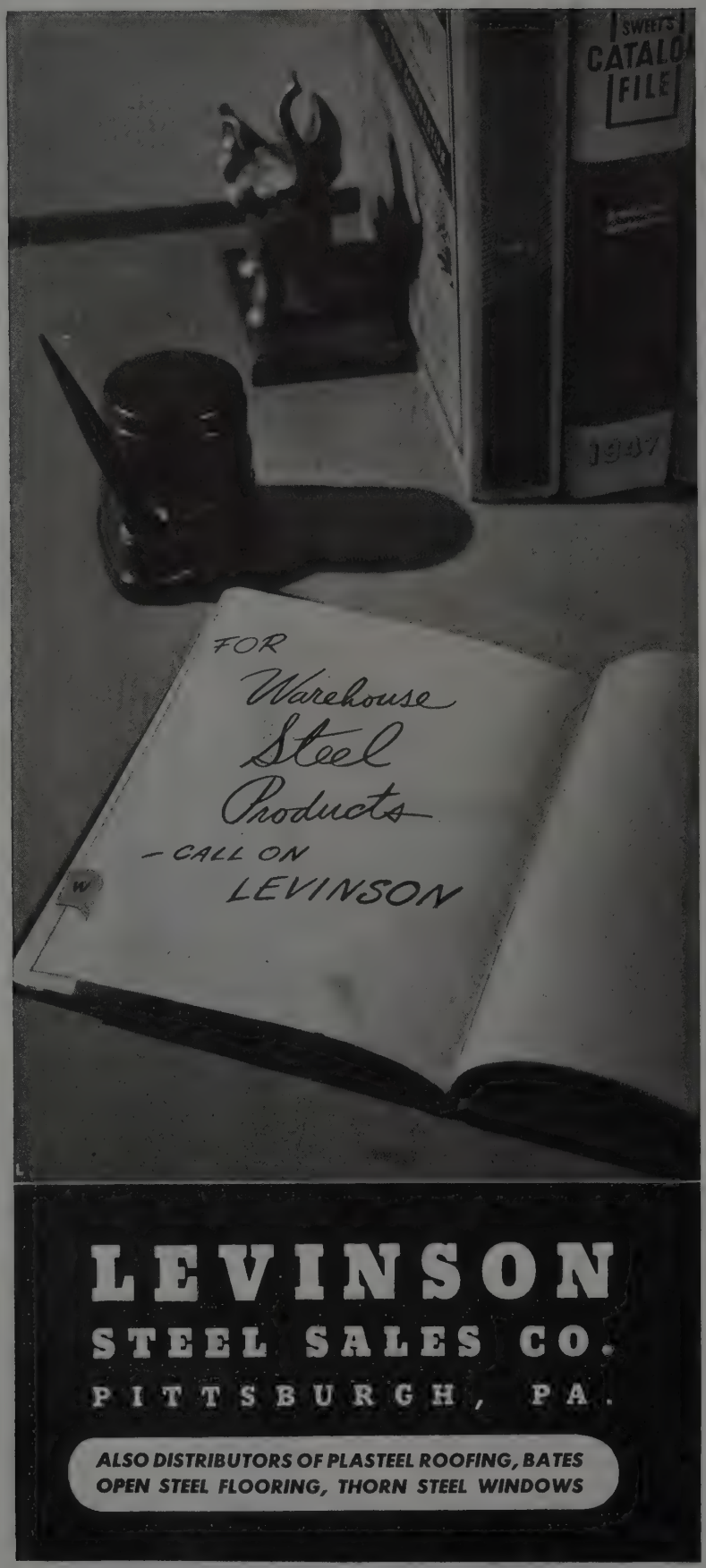


POWER PLANT found Sun Diesel Lubricant lasted 50% longer.

A TEXTILE MILL increased slashing speed 60% by adopting a Sun Processing Oil.

PRODUCTS

SUNOCO



Die-Block Flaws

(*Continued from Page* 95)

or parts of half-cycles between the flaw indication and the back reflection or between the initial pulse and the flaw indication.

After the arrival of the instrument at the Heppenstall plant, work was started in the die block department and it was soon apparent that a great deal of investigation would be necessary before the so-called "defects or indications," appearing on the sweep line, could be accurately interpreted. As soon as it was definitely noted that the instrument, when tuned at 5 or 2¼ megacycles, could indicate a difference of grain size between an annealed block and a fully heat treated block, if the amplification were too high, standards had to be prepared which would make it possible to set the instrument at exactly the same sensitivity each time it was put into operation.

Checking the Instrument

The standards included two die blocks. The first standard block was annealed, but was coarse grained and of excellent quality. The second standard block was normalized, quenched, and tempered with a fine grain, but with internal ruptures. Each time the instrument is tuned to start work, it is adjusted to eliminate the coarse grain in the annealed block. Then it is checked on the block with internal ruptures to make sure that that instrument is picking up known defects and impressing them sharply on the screen. This routine check is made several times during the working period to be certain that the instrument has not varied in sensitivity because of temperature changes or other causes.

During the preliminary work, all of the questionable blocks which came under observation were carefully plotted on a standard form developed for the purpose. Each indication or flaw was located with respect to its location on the surface and its depth in the block as measured from the bottom of the block. All indications are located in the block, measuring from the bottom or back reflection, as the back reflection presents a more clearly defined line on the sweep than the initial pulse. The size of the indication, as measured from peak to peak, is also recorded.

It must be kept in mind, however, that the size of the indication as viewed in the scope is not too important. A small crack, for instance, may lie in the block parallel to the transmitting crystal, and therefore reflect a maximum number of impulses back to the crystal, whereas if it lies at a sharp angle to the plane of the surface a considerable number of impulses will be cast off in various

irections and a far less number of echo-
g reflections will return to the face of
e crystal to be picked up. This results
a definite change in the size and shape
the indication as viewed in the scope.

After the blocks were plotted, each
ad one or more 1-in. slabs cut out
be ground and etched. These slabs
roved beyond any doubt that on this
pe of material, which has reasonably
arallel surfaces, top and bottom, and a
mooth ground finish, the Reflectoscope
accurate in picking up and locating
ajor or minor flaws within ⅛-in., pro-
ding the instrument is properly handled.

The investigation pertaining to the
terpretation of flaws, or indications, as
own in the scope tube has, of course,
een carried along during all the pre-
minary work and will be continued in
e future. Some indication of the type
f defect is gained by outlining so-called
defective areas" on the surface of a
iece.

After several months of preliminary
ork the Reflectoscope was installed in
e die block production line and a man
as carefully chosen and trained to test
very block. The blocks having ground
rfaces, of course, presented no surface
roblems. With the use of a solution
f glycerin and Aerosol, in the place of
e light insulating oil, it was found that
locks which had been planed using
90 mm feed could be easily tested.
s a result, every die block manufac-
ured is now tested by the instrument
efore shipment.

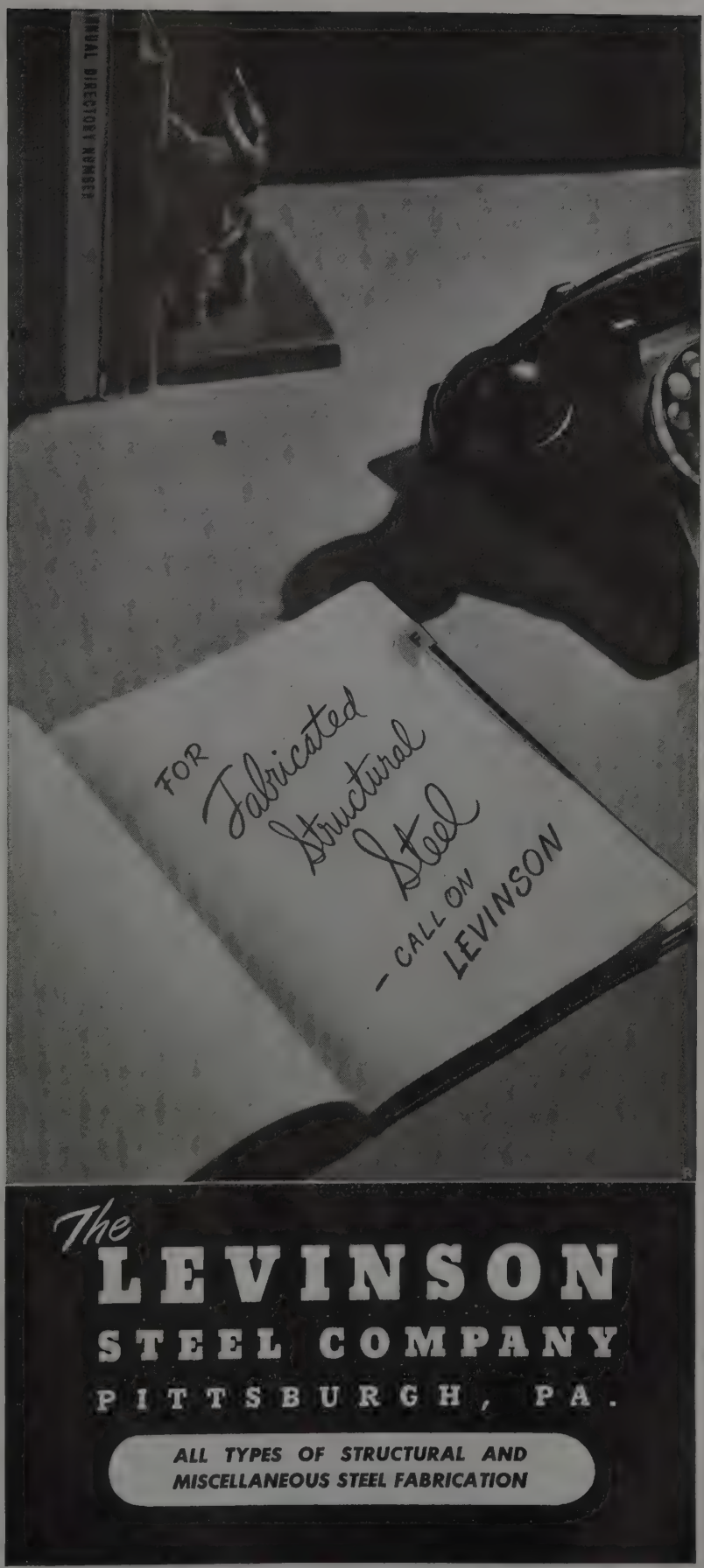
Industrial Importance of Wire Rope Shown in Film

Importance of wire rope in many industries, and how it requires careful engineering and manufacturing are illustrated in a new slide film entitled "Lifeline" being made available by Macwhyte Co., Kenosha, Wis. The 25 min presentation consists of a story given by means of electrical transcription and a series of projected pictures.

How the wire rope must be first engineered and designed for the job required, how it is made in one continuous length and tested, how wire is processed into wire rope and other subjects are included.

—o—

"Electronics in Automatic Chemical Feed Systems" is the title of a technical paper written by Robert T. Sheen, consulting engineer, Milton Roy Co., Philadelphia and offered gratis by the company. Systems mentioned are applied in treating process water, water supply, continuous processing operations, cooling and boiler feed water and others.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LAMINUM
THE SOLID SHIM THAT peels FOR ADJUSTMENT

Preweld Cleaning

(*Continued from Page* 96)

cleaning as it removes only dirt and grease. Some other method must be used if scale is to be removed.

Type of chemical method used depends upon the material being cleaned. An acid dip more or less uniformly cleans the entire surface. Care, however, must be taken to prevent over exposure, which may cause the part being cleaned to be partially consumed by the acid. Sulphuric and hydrochloric acid often are used with the addition of restrainers, usually organic materials such as glue or starch. These act to reduce formation of acid spray or mist due to bursting bubbles of hydrogen in the surface, and also to restrain the acid from attacking the metal. Unless care is taken the acid will pit the steel, and the hydrogen which is evolved in the acid cleaning of steel, is occluded in the metal and will make it brittle. In some cases, it may be desirable to use a degreaser of some sort, either vapor or dip, to remove oil and grease before the acid dip so that the etch will be uniform. Grease and oil will retard the etching action or pickling by the acid.

Using Alkaline Dips

Alkaline dips are sometimes used as degreasers and sometimes as etchants, depending on the materials being treated. Many alkaline dips must be controlled closely, as in the case of acid dips, to prevent the consumption of the base material.

Metals most widely welded fall in the following classifications: Mild steel, stainless steel, aluminum, and Monel, nickel and Inconel. Most cleaning problems encountered involve one or more of these four types of metals.

Few difficulties are encountered when welding mild steel. However, cleaning—or lack of cleaning—may cause serious problems. In the first place, all oil, grease, and dirt should be removed. A certain amount of mill scale is generally not objectionable for fusion welding, but in the case of resistance welding any mill scale soon fouls the electrode tips.

Grease, oil, and dirt can be removed by vapor degreasing, and if the parts being cleaned have been recently machined or stored in grease, further cleaning may be unnecessary. To remove scale before welding, one of several methods may be used. As previously mentioned, chipping, manual grinding, or wire brushing is usually satisfactory for low production jobs, and on assemblies which are too large to grit blast. Grit blasting, with either sand or shot, does an excellent job on mild steel. Shot-blasting is found to be very satisfactory

TUBING TAMES A TUNNEL PROBLEM

Penflex "Flexineering" solves air transmission problem on new Battery-to-Brooklyn tunnel project

Far out in the East River an island is growing. It's "man-made" for the Battery-to-Brooklyn tunnel project . . . and presents many construction problems. One was transmitting compressed air from a nearby floating unit of compressors, over the water, and on to the island for powering pneumatic tools used in construction operations.

That's where Penflex Engineers went to work. Ordinary air lines would not stand the pressure. Rigid pipes were not practical due to constant motion of the river. Result? "Flexineering" presented the right answer by specifying Penflex Tubing from compressor unit to the main air lines. Plenty of motion . . . plenty of pressure . . . yet entire job is safe and working steadily under all conditions.

Penflex "Flexineering" (the science of engineering each type of flexible metallic tubing to the particular problem) can help you solve many problems of maintenance, production, and designing of products.

Penflex manufactures a complete line of 4-wall interlocked flexible metallic hose from $\frac{1}{8}$" dia. to 30" dia. Also, seamless welded flexible tubing from $\frac{5}{32}$" dia. to 2" dia., automatic barrel fillers, rivet passers, accessories and fittings. We offer our engineering service and products to improve your production. For further information on the above tunnel case history, write today to Dept. 14.

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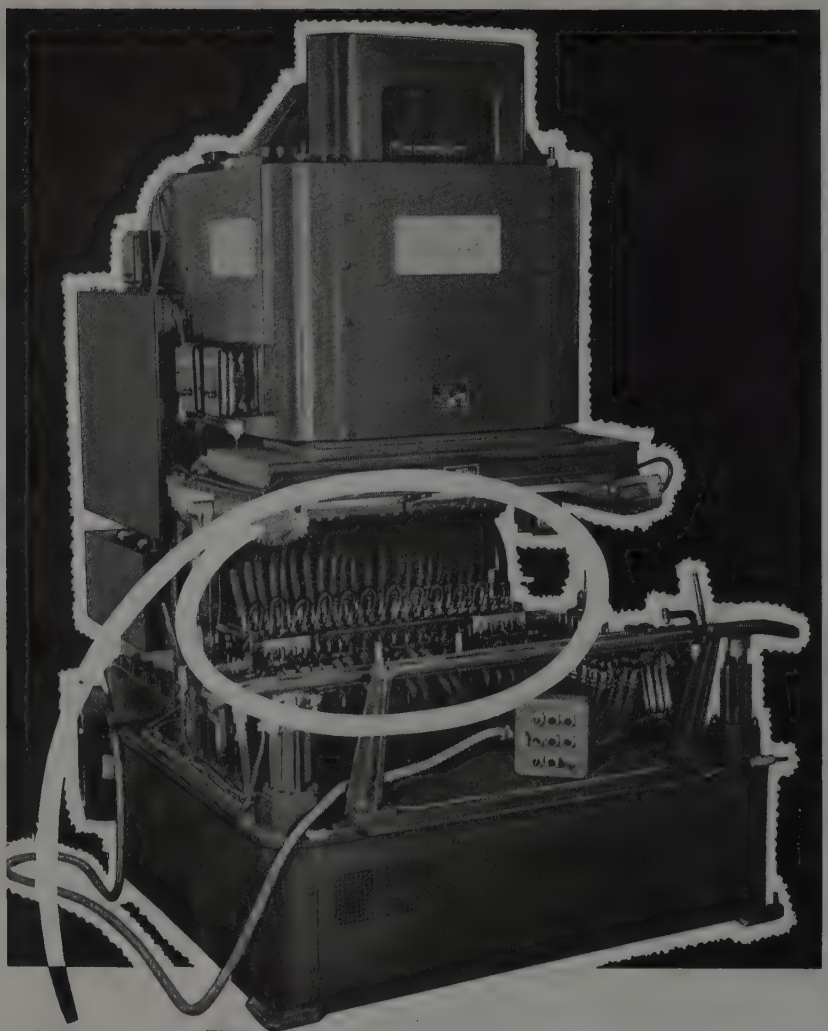

Here, Resistance-welding Costs "Get the Business"

The toughness of Ampco-weld resistance-welding electrodes reduces down-time, increases production, saves money . . .

The machine shown above—and 5 more just like it — must produce 1404 spot welds per minute. They are used by a leading automobile manufacturer to turn out 18 complete underpan assemblies per minute—each pan requiring 78 spotwelds.

Rigorous production schedules such as this, call for trouble-free operation. Ampco-weld resistance welding electrodes are ideal for this kind of service. They combine the hardness and toughness necessary to resist mushrooming and wear, with a high electrical conductivity that resists sticking to the work. Because of these features, Ampcoloy electrodes require less dressing — down-time is greatly reduced; production is increased.

The Ampco line of resistance welding electrodes and alloys is complete. It includes standard and special holders; all products meet R.W. M. A. specifications. Furthermore, Ampco is glad to furnish engineering service for specialized applications. Consult your nearest Ampco field engineer and write for latest bulletins.

Ampco Metal, Inc.

Department S-4 • Milwaukee 4, Wis.

AMPCO

RW-8

on parts to be resistance welded. Either shot or sandblasting is satisfactory for fusion welding. Pickling is not widely used for removing scale from mild steel before welding.

Stainless steel is being used more and more in the fabrication of beer barrels, milk containers, railroad equipment and airplanes. Cleaning such steel before welding is a rather controversial subject. This steel is available in a variety of surfaces, from bright to heavily scaled. Here, again, the general rules apply. That is, all oil, grease, dirt, and excessive scale should be removed, although in many cases the small amount of oxide on the surface, which may be called mill finish, is not objectionable. Many advocate pickling for all types of welding. Others use abrasive methods for cleaning. For fusion welding, these methods of cleaning eliminate one variable which may cause trouble. A great deal of welding, however, is done with the mill finish left "as is." With resistance welding the problem is different. Tests made by General Electric indicate that better welds can be made by spot or seam (resistance) welding on a mill finish with all oil, grease, and dirt removed than can be obtained when the material is prepared by pickling or grit blasting. Indications are that in these cases something remains on the surface which causes porosity in the welds. It may be hydrogen from pickling, silicon from sandblasting, or high alloy scale from shotblasting. The results show up in surface appearance and soundness. When seam welded the surface may be filled with small cracks or covered with a fish scale effect. The porosity will cause fatigue failure or poor test results. It is possible, of course, that the experience of others may refute this statement but our tests produce the evidence described.

Clean Prior to Welding

Cleaning is advocated prior to welding aluminum. The cleaning operation is one of the most critical steps where the welding procedure for this metal is involved. The oxide of aluminum forms rapidly even at room temperature, so that even the time element is critical. Many codes specify the type of cleaning and the time interval which is permissible between cleaning and welding. Most authorities permit up to a 5-hour interval between cleaning and welding. One of the most widely used cleaning methods is to dip the aluminum in a sodium hydroxide solution, rinse first in water, then in a nitric acid solution for brightening, then rinse in water again. Tests conducted by government agencies, universities, and industrial organizations reveal that the time of immersion in the caustic solution has a pronounced effect on the results obtained by resistance

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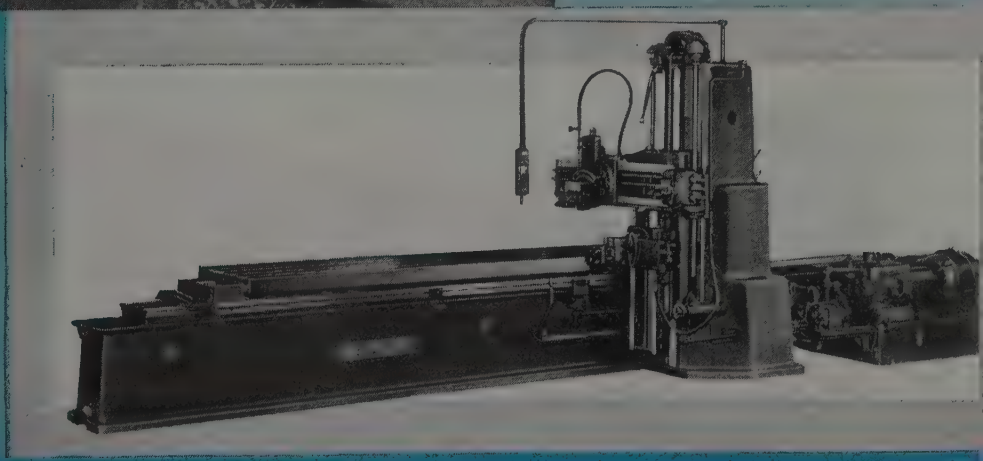
Built in five standard sizes with table stroke lengths ranging from 42" to 144", Shaper-Planers are equipped to your specifications with single or double cross rail head . . . and with side rail head.



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FASTER WORK on the "in-between" jobs . . . . . .

Because it's Hy-Draulic, the Rockford Shaper-Planer will give you faster work, on every type of shaper-planer job. The steel castings being machined above represent a typical application . . . work that is too small for standard planers, yet too large for shapers.

The reasons are many why Rockford Hy-Draulic Shaper-Planers hold "floor-to-floor" time to a minimum. Controls are centralized and responsive, speeding up both set-up and actual machining time. Cutting strokes may be quickly set for *any* length and speed required within capacity limits . . . reversals are fast. To help decrease your overall machining costs, we suggest you get the facts on Rockford Hy-Draulic Shaper-Planers. Ask for Bulletin 445.

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Hy-Draulic

welding, since there is an optimum period of time at which the surface resistance to electric flow is most suitable for welding.

In fusion welding, over-immersion has no such effect although the dimensions may be reduced from over-etching. Several concerns now offer materials for cleaning aluminum which eliminate these objections.

In inert-arc welding, where no flux is used for welding aluminum, a sulphuric acid dip is superior to nitric acid for brightening. Inert-arc welding is accomplished by using an argon-shielded tungsten arc. When using nitric acid as a brightener, considerable porosity results and a black deposit forms on the surface. This may be explained by the fact that even a small excess of nitrogen in argon gas will cause the same trouble. Probably the release of some nitrogen from nitrides formed on the surface of aluminum has the same effect.

Grit blasting is not satisfactory for cleaning aluminum because the oxides are imbedded in the soft material along with some of the grit. Grinding or emery disk cleaning will give a satisfactory surface but these processes are slow.

Even in processes where flux is used, the removal of oxides from the surface of aluminum is essential. Needless to say, all foreign materials such as grease, oil, and dirt must be removed by some method of degreasing. When flux is used, a second cleaning process is necessary, since all traces of flux must be removed to prevent corrosion.

The nickel alloys most widely used are Monel, Inconel, and commercial pure nickel. Each of these alloys is readily weldable. Grease, oil, dirt, and products of corrosion when taken into the weld melt may cause embrittlement of such high-nickel materials; therefore cleaning is essential. Grinding, either with a fine wheel or a disk grinder, is very effective if all the surfaces to be welded are cleaned down to bright parent metal.

Different combinations of nitric acid, sulphuric acid, and hydrofluoric acid, plus water and table salt, are used for pickling. The parts must be thoroughly washed after pickling, then neutralized with dilute ammonia to remove all traces of acid.

Almost all the cleaning methods discussed here are both expensive and even considered bothersome. Welding-minded individuals may have gone "overboard" in attempting to eliminate this variable in their efforts to gain acceptance for welding. Perhaps, in the end, many of these precautions are unnecessary.

However, it is hoped that this discussion will tend to evoke a wider interest in the problem of cleaning before welding, and perhaps result in an even more extensive investigation of this subject.

Motor Reversing Time

(*Continued from Page* 110)

strains the armature and normally holds it in the open position. When this condition is attained, the armature will move from the open to its closed position. The magnetic flux will immediately increase to a value of ϕ(seal) as indicated at point 2. This increase in flux without any change in magnetizing force results as the reluctance of the magnetic circuit changes from a maximum when the armature is in the open position to a minimum value when the armature is in its sealed position. Any additional increase in the voltage applied to the main coil winding will increase the flux only slightly from point 2 to point 3.

It should be noted that when the armature is closed that the iron in the magnetic circuit is practically saturated by the armature pickup magnetizing force. This is an important and desirable characteristic as the relay will not be substantially affected by variations in line voltage.

After the relay armature has closed,

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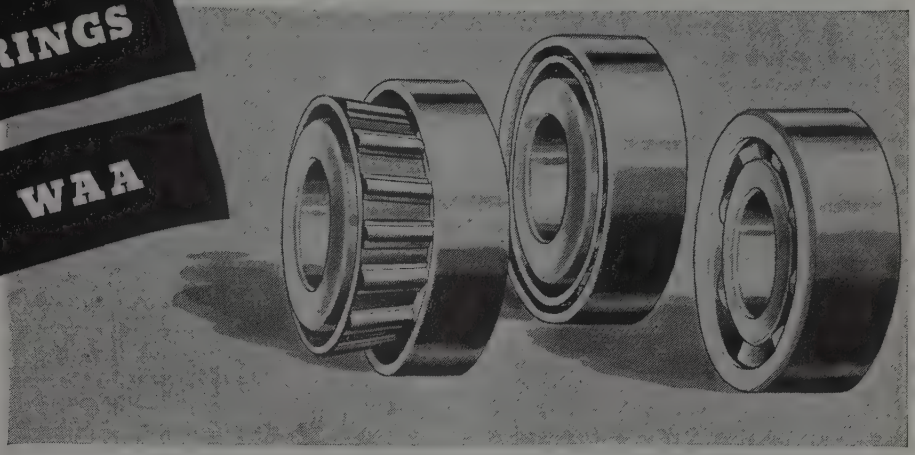

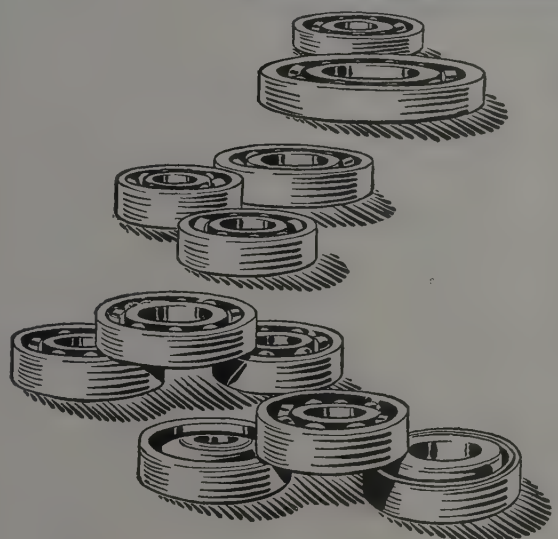

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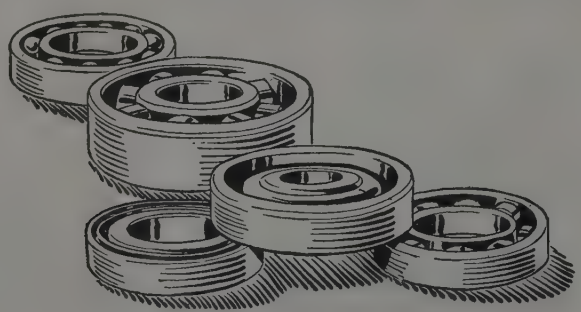

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Prices on CLARK products will not be advanced in excess of increased costs.

the maximum flux value ϕ(Max.) can be established as indicated at point 3 by applying rated voltage to the main winding of the operating coil. When the main coil winding is then de-energized to reduce the magnetizing force to zero, the flux in the magnetic circuit will immediately drop to point 4 which is the residual flux value ϕ(Residual). However, even though the magnetizing force is zero, the relay armature will still remain in the closed position indefinitely as the force produced by the residual magnetism ϕ(residual) greatly exceeds the force of the armature kickout spring.

In order to release the armature, a magnetizing force in opposition to that of the main coil winding must be impressed upon the magnetic circuit to neutralize the residual magnetism. The neutralizing winding is used for this purpose. As the de-magnetizing force is increased, the flux will decrease along the portion of the curve marked 4-5. When the flux in the magnetic circuit decreases to point 5 and a value of ϕ(dropout), where the magnetic force is less than the armature kickout spring force, the relay armature will be released and the control contact will close.

As soon as the armature is released, an air-gap will be introduced into the magnetic circuit. The flux will then drop to a value slightly below zero at point 6 because of the neutralizing magnetic force. Also, as soon as the neutralizing force NI(dropout) is decreased to zero, the flux will decrease to zero and the relay will be ready to repeat the cycle.

The two sections of the coil are wound on a common insulating tube. The armature dropout time depends only upon the time that it takes the neutralizing winding magnetic force to reach a value of NI(dropout).

For proper operation, the main and neutralizing windings must always be connected so that their magnetizing forces are in opposition.

As the operation of this relay is based upon an electromagnetic phenomenon, this type of relay will provide reliable operation and have a constant dropout characteristic.

c. Adjustments: The pickup voltage, or the voltage which it is necessary to apply to the main coil winding to cause the relay armature to move from its open to its sealed position, can be adjusted by changing the armature kickout spring force. It can also be varied by adjusting the stationary contact position to change the air-gap between the armature and core. This particular adjustment changes the armature travel. When the contact gap on a typical relay assembly is adjusted so that there is approximately 3/16-in. distance between

This 12,500% increase *sounds fantastic!*

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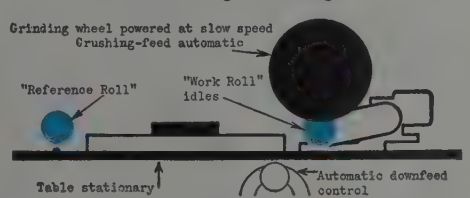
One of the major drawbacks to crush form grinding precision flat form contours has been the inability to produce on a practical production basis. This obstacle has been eliminated in two ways by the new Thompson Truforming Process.

First: Truform Grinders are engineered and built as a single unit, eliminating the failures of make-shift crushing arrangements and attachments.

Second: TWO CRUSHING ROLLS ARE USED. This is a major advancement, because it greatly extends crushing roll life and makes possible, for the first time, quantity production without constantly disturbing the set-up to re-process the crushing roll.

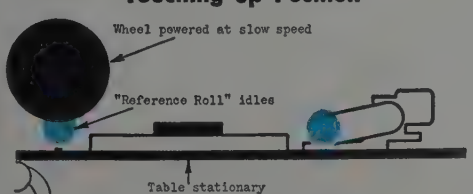
How two rolls operate in the Truforming Process is briefly illustrated and described below. The normal crushing or truing position is shown first.

Normal Crushing Position
Also Truing or Dressing



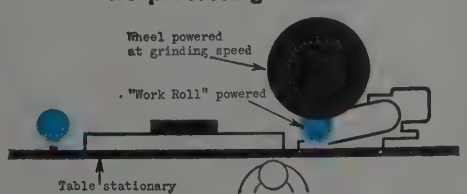
This is the position for the initial crushing of the wheel—and for subsequent truing or dressings when production grinding. On an eight pitch modified buttress thread form, 125 dressings were provided by the "work roll" before losing form.

Touching-up Position



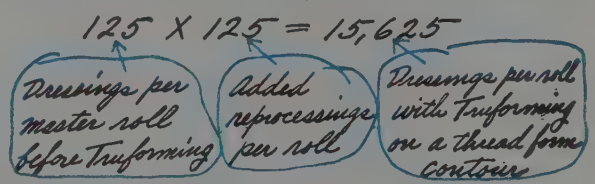
When the "work roll" loses form the table is moved to bring the grinding wheel over the "reference roll" for touching up, as shown above.

Re-processing Position



Because both rolls are table mounted, are in perfect alignment, and can be brought in the same relation to the grinding wheel, the original degree of accuracy can be quickly transferred from the "reference roll" back into the grinding wheel . . . and then ground back into the "work roll" as shown above.

The machine is then ready for production grinding again without disturbing the set-up or removing anything from the machine. In this way the "work roll" can be re-processed whenever it loses form and can be used for hundreds of additional dressings, or until it is worn out. Duplicate crushing rolls can be ground in the same way on all Thompson Truform Grinders.


125 X 125 = 15,625
Dressings per master roll before Truforming
Added reprocessings per roll
Dressings per roll with Truforming on a thread form contour

What this means in savings is illustrated by the following example, involving a modified buttress thread form with an eight pitch form. Where two rolls are used in the Thompson Truform Process, it was possible to get *over 15,625 dressings* from the "work roll" before it was worn out. This meant an increase in continuous production (without changing or disturbing set-up) of 12,500%.

Write for the new 8-page Truform Leaflet—"Why didn't you tell me about this process before?"

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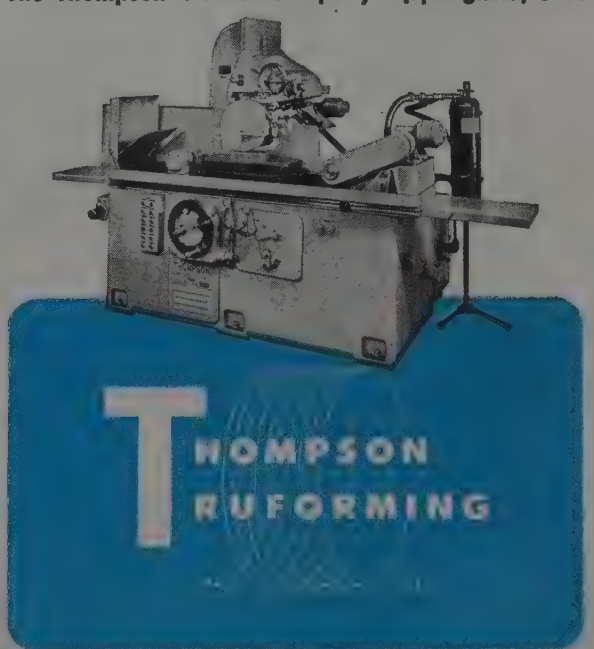

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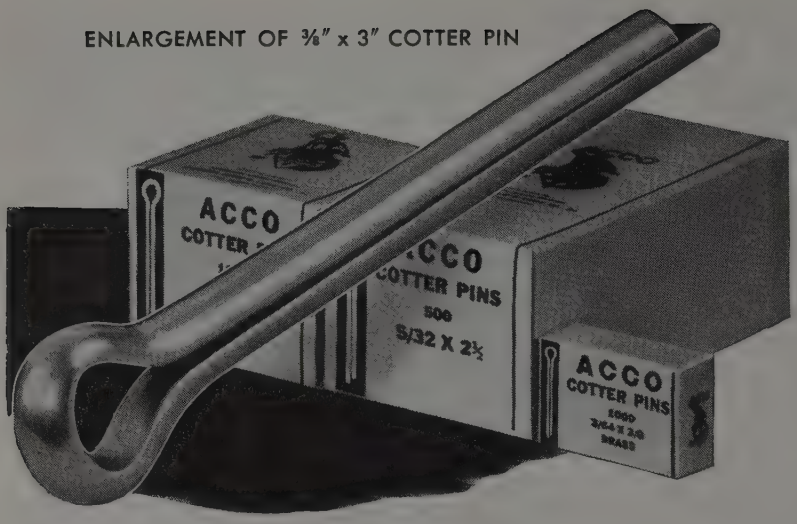
ENLARGEMENT OF ⅜" x 3" COTTER PIN



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the moving and stationary contacts when the armature is in the fully sealed position, the armature will generally pickup on 35 per cent of rated voltage on the main coil winding only. The kickout spring should be set for a minimum restraining force to obtain this minimum pickup characteristic. When the kickout spring is adjusted for the maximum restraining force, the relay armature will close on about 60 per cent of rated coil voltage.

Dropout voltage or the value of voltage that must be applied to the neutralizing winding to neutralize the residual magnetism to release the armature can be changed only by adjusting the armature kickout spring force. If the relay armature has been closed by energizing the main coil winding only with rated voltage, the armature will remain in the closed position when the coil is then deenergized. With only the neutralizing winding energized and correctly connected so that its magnetic effect opposes that of the main coil winding and the residual magnetic field, the relay armature will be released when the voltage impressed on the neutralizing winding is approximately 3½ per cent of the rated coil voltage. This dropout value is secured only when the armature kickout spring is adjusted for a minimum force value. If the spring is set for the maximum force, the armature will be released on about 2 per cent of the rated coil voltage.

Applying Plugging Relays to a Controller

Two relays are always applied to a reversing plugging controller.

In the diagram shown in Fig. 3 all contacts are illustrated in the position that they would normally have when the power supply is disconnected. Whenever power is applied to the operating coil of a relay or contactor to operate the contacts, the relay or contactor is referred to as being energized.

To prepare a controller for operation, the main and control circuit knife switches should be put in the closed position.

As soon as the control circuit bus is energized and if the master switch is in the Off position, the contactor coil CR which has an initial circuit through the master switch Reset contact will be energized.

The contact CR on the contactor CR will close to shunt the Reset contact so that the master switch will be effective in its other positions. In case the overload relay 1-OL or 2-OL operates, contactor coil CR will be deenergized and the main contacts 1M will open to stop the motor. This circuit provides low-voltage protection in case the power supply fails. This ar-

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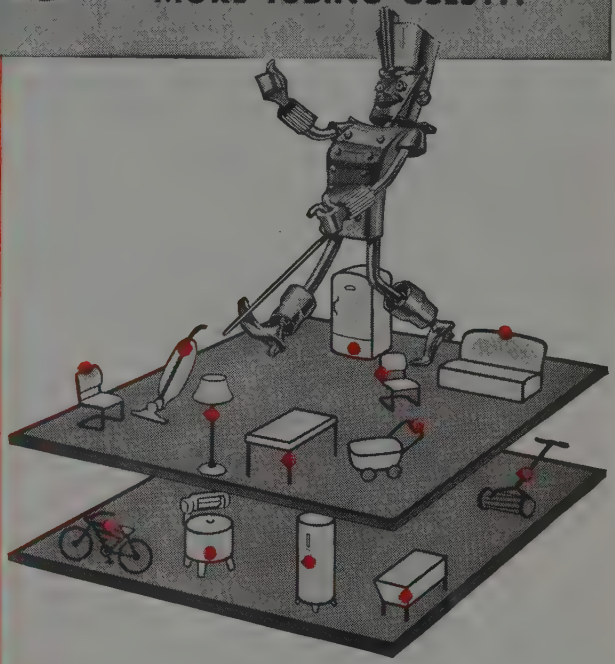

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rangement prevents starting of the motor unless the master switch has been returned to the Off position and all of the starting resistance inserted in series with the motor armature.

The plugging relay main coil windings FP_M and RP_M will also be energized and the contacts FP and RP will open.

When the master switch is moved to the first point forward, contactors 1F, 2F, and 1M will be energized and their contacts will close and connect the motor armature to the power supply with the maximum value of starting resistance in series with the armature. The inductive time delay relay coils 1T, 2T, and 3T will be energized by the voltage drop across the starting resistor and their normally closed control contacts 1T, 2T, and 3T will open. The drop across the starting resistor R1-R5 is approximately equal to the line voltage less the motor armature 1R drop when the motor armature is at standstill or rotating slowly. As soon as the line contacts 1F, 2F, and 1M close, the motor armature will start to rotate with reduced voltage on the armature if the load is not too heavy.

When the 1F contactor closes, its normally closed auxiliary contact $1F_A$ will open and de-energize the forward plugging relay coil FP_M. The forward plugging relay armature momentarily remains in the closed position as it is held by residual magnetism. The normally open auxiliary contact $1F_A$ will also close.

The forward plugging relay neutralizing winding FP_N is energized by the voltage drop across the motor armature and part of the drop across the potentiometer connected between points S1 and R4. The polarity of these voltage drops is such that the resultant current flow through coil FP_N produces a demagnetizing field which opposes and quickly neutralizes the residual magnetism of the forward plugging relay. As soon as the residual magnetism is neutralized, the armature will be released and the contact FP will now close.

Moving the master switch handle to the second point will energize the plugging contact or coil P. Contactor coil P is energized through a master switch contact, interlock contact $1F_A$, plugging relay contact FP, and the interlock contact $1R_A$. The closing of the P contacts will short-out the plugging resistor section R1-R2.

The motor torque developed on the first point of the master switch may be insufficient to start the load if it is heavy. However, on the second point, the motor can generally provide enough torque to accelerate under any load conditions.

When the P contacts close and short-out the resistor section R1-R2, the time relay coil 1T is also short-circuited.

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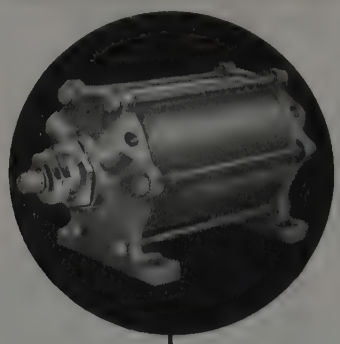

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After a brief time delay period, the contact 1T will close.

After the time delay period of relay 1T has elapsed and when the master switch is moved to the third point, the accelerating contactor coil 1A will be energized. The contacts 1A will close and short-out section R2-R3 of the starting resistor. Shorting-out this second resistor step will accelerate the motor to a higher speed. The closing of contacts 1A will also short the time delay relay coil 2T and initiate the second time delay period.

After a suitable time delay period, contacts 2T will close. If the master switch has been moved to the fourth point, contactor coil 2A will be energized and the contacts 2A will close and short-out section R3-R4 of the resistor. The motor will now be accelerated to a still higher speed. The shortening of coil 3T will initiate the third time delay period and after appropriate time delay period, contacts 3T will close. This completes the circuit to and energizes the last accelerating contactor coil 3A. Contacts 3A will short-out section R4-R5 of the resistor. As the resistor has now been completely shunted, the motor armature will be connected directly across the line and will eventually operate at rated speed.

If the master switch is moved back to one of the intermediate points, the portion of the starting resistor corresponding to that point will be inserted into the armature circuit and the speed of the motor will decrease. If the motor is lightly loaded, the voltage drop across the resistor may be insufficient to energize the timing relay coils again. However, if the load is great enough to make a timing period desirable to prevent high-current peaks when the motor is re-accelerated, there will always be sufficient voltage drop across the resistor to energize the timing relays. This particular circuit diagram is similar to those used for cranes where it is desirable not only to start the motor smoothly, but also to provide control for operation at intermediate speeds.

After a careful study of the diagram has been made, it should now be evident that the identical sequence of controller operation would be obtained whether the master switch was advanced slowly from point to point or if it was moved rapidly from the Off to the last point. This operation occurs as the circuits to all coils except CR, FP_M, and RP_M are originally open and the coils can be energized only in a definite sequence. The accelerating contactor coils 1A, 2A, and 3A can not be energized until the timing relays function.

The controller operation for the reverse motor direction is similar to that

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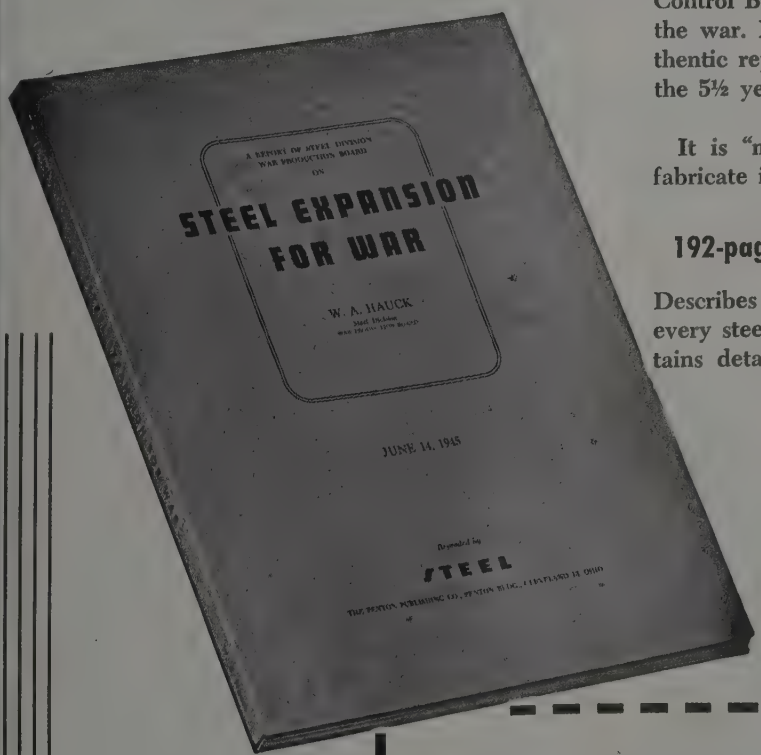

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for the forward direction except the reverse direction contactors 1R and 2R are employed to change the direction of the current flow through the motor armature. In the reverse direction controller sequence, the plugging contactor P will be energized through the master switch contact, interlock contact $1R_A$, plugging relay contact RP, and interlock contact $1F_A$.

The motor can be plugged by moving the handle of the master switch rapidly from its position for one speed direction to a position for the opposite speed direction. When the master switch is operated in this manner, the current flow through the motor armature will be reversed and the complete resistor section R1 and R5 will be inserted into the armature circuit. Depending upon the direction, either the plugging relay FP or RP will prevent the plugging contactor P from closing until the motor armature decelerates to approximately zero speed. During the plugging operation, the current flow through either the neutralizing winding FP_N or RP_N is such that it does not neutralize the residual magnetism of a plugging relay, but produces a magnetic force which assists the residual magnetism in holding the plugging relay armature in the closed position. It should always be remembered that even though the direction of the current flow through the motor armature changes, the polarity of the motor counter emf does not change until the motor actually reverses its direction of rotation. As long as the motor counter emf exceeds the armature IR drop, the current flow through the plugging relay neutralizing coil winding will assist in holding the relay armature closed. However, as soon as the motor decelerates to approximately zero speed, the current flow through the neutralizing coil winding will reverse and be in such a direction as to neutralize the residual magnetism of the plugging relay. When this occurs, either the plugging relay contact FP or RP will close and energize the plugging contactor coil P. The controller will now accelerate the motor in a manner similar to the operation which occurs when the motor is initially started from standstill.

The actual motor speed at which the plugging relays operate to energize the contactor P can be controlled over a suitable range by varying the setting of the slider on the potentiometer connected between points S1 and R4. The voltage drop across the potentiometer is in series with the motor armature IR drop and produces an effect on the plugging relay operation equivalent to increasing the motor armature IR drop.

The actual voltage at which a plugging relay armature will be released

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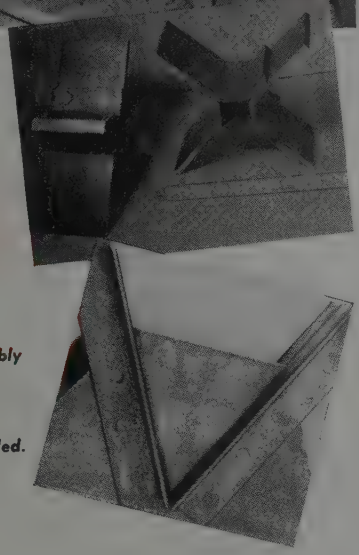

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● Handles intricate cuts easily. No distortion. Unusually strong and durable, geared to give great power with little effort. Metal can turn any direction while cutting.

● Machines available for 14 ga., 10 ga., and 3/16 in. material.

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BEVERLY SHEAR MFG. CO.
3007-9 W. 110th Place
Chicago 43, Ill.

from being held by the residual magnetism can also be changed by adjusting the relay armature kickout spring.

To understand the plugging operation and to compare the motor armature current direction, direction of rotation, polarity or the armature IR drop and counter emf at a given instant in the sequence of operation, this information has been tabulated step-by-step in table on pages 108-9. Only the essential circuit elements necessary for plugging are illustrated. The circuit illustrated operates slightly different from that shown in Fig. 3 in that the plugging contactor P closes immediately after the line contactors close.

Plugging Reversing Controller Maintenance Suggestions

Continuous operation of a controller and a plugging relay will be more readily understood and maintained if the following points are borne in mind:

1. The contact gap and armature kickout spring on a plugging relay should be adjusted so that the relay armature closes on not more than 60 per cent of rated voltage on the main coil winding when it is at the ambient temperature.

2. The plugging relay armature should never close when the cold neutralizing coil winding is energized with a voltage less than 125 per cent of the rated coil voltage.

3. The two windings of a plugging relay coil should be connected so that their magnetic fields oppose each other. A residually held relay armature should be released when the neutralizing winding is energized with at least 3½ per cent of the rated coil voltage.

4. A plugging relay armature should be held closed by residual magnetism for an appreciable time when the main coil winding only is energized and then de-energized.

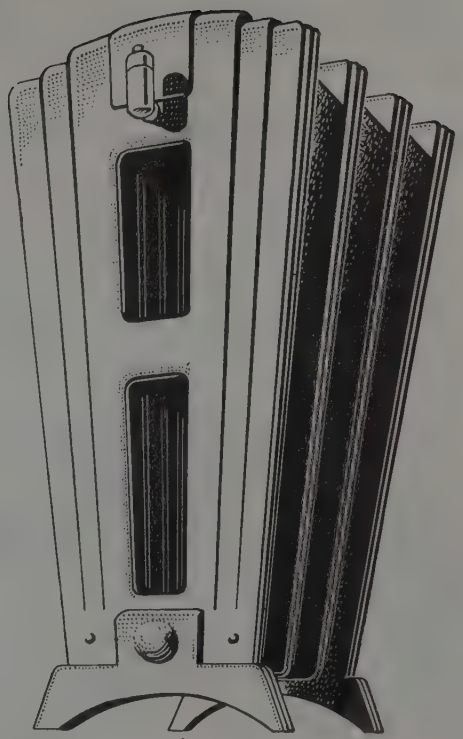
5. The relay sealing surfaces should be as clean as possible as any dirt or dust between the armature and frame will decrease the dropout voltage value and may cause the relay to close the plugging contactor at a relatively high motor speed.

6. After a relay armature has been magnetically closed and the main coil winding de-energized, the magnetic field of the neutralizing coil acts either to oppose the residual magnetism and to release the relay armature (this condition is similar to a motor starting from rest), or to assist the residual magnetism in holding the relay armature closed (this condition occurs while the motor is decelerating after being plugged).

—o—

National Bureau of Standards, Washington, reports that in the absence of active opposition, the commercial standard for work gloves, identified as CS139-47, is to be considered effective for new production from March 6, 1947.

LITTLE BOLTS DO BIG JOBS
for
Heating Equipment Manufacturers



DID YOU KNOW *that Buffalo Bolt has its own rolling mill and controls the quality of its products from billet to final threading . . . the latter operation being illustrated above.*

THE development of modern home heating equipment is highlighted by its clean appearance, compact size, high efficiency and fully automatic operation. Not so obvious—though equally important—is the part played by present-day fasteners in the assembly of this equipment . . . fasteners such as the special Circle Ⓑ Bolt illustrated which is used in large volume by leading radiator manufacturers.

Circle Ⓑ Bolts and Nuts are produced to meet the requirements of the most advanced equipment designs. These famous fasteners, standard or special, are noted for their uniform size and strength . . . qualities that keep assembly lines moving with maximum efficiency . . . qualities that contribute to the appearance and durability of the equipment on which they are used.

Ⓑ **BUFFALO BOLT COMPANY**

NORTH TONAWANDA, N. Y. • SALES OFFICES IN PRINCIPAL CITIES

Export Sales Office: Buffalo International Corp., 50 Church Street, New York City

IT TAKES A "HEAVYWEIGHT"

For Safe, Positive Lubrication of Heavy Machines

Alemite Lubrication Equipment packs the "punch" needed to service the heavy machines of the steel industry. It provides both large volume delivery and high pressures. The result—the right amount of lubricant always reaches the bearing surfaces where it can do its protective job.

It's SAFE Lubrication—the oiler works at a safe distance from moving parts. The lubricant is never exposed to moisture or other contamination because it is pumped direct from original drums.

It's POSITIVE Lubrication—the oiler has "finger tip" control of ample grease volume and pressure to flush bearings of old grease, dirt and moisture.

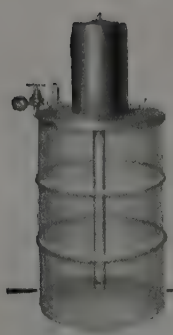
Get details from your Alemite Jobber or write to Alemite, 1879 Diversey Parkway, Chicago 14, Illinois.

ALEMITE ELECTRIC BARREL PUMP

Model 6735—For heavy duty service. Builds up to 3000 lbs. grease pressure. Delivers 14 oz. of grease per minute. Handles fibrous, heavy and light-bodied lubricants directly from original drums. Equipped with ½ H.P. 110-220 volt A.C. motor. Low pressure models handle fluid lubricants for gear case lubrication.

ALEMITE HEAVY DUTY AIR OPERATED BARREL PUMPS

Pump Lubricant from Original Drums



Model 7707-C—Barrel Pump equipped with 6" diameter air motor. Exclusive Dyn-a-matic Primer permits the pumping of heavy fibrous lubricants even at low temperatures. Delivers up to 6 lbs. of grease per minute. Models available that develop pressure of either 11, 15, 40 or 80 times the air pressure applied.

Model 7701—Equipped with 4½" diameter air motor. Exclusive Dyn-a-matic Primer permits the pumping of heavy fibrous lubricants even at low temperatures. Delivers up to 6 lbs. of grease per minute. Models available that develop pressure of either 5½, 7½, 20 or 40 times the air pressure applied.

STEWART WARNER

ALEMITE

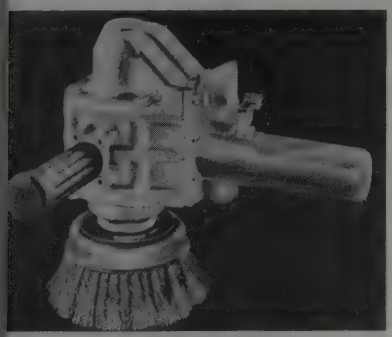
Alemite ALONE Combines all 3 in Lubrication

1. EQUIPMENT 2. PROCEDURES 3. LUBRICANTS

Additional information on the new products and equipment described on this and succeeding pages may be obtained, without obligation, by checking appropriate numbers on the cards following page 160

1. Vertical Air Grinder

The B-30 vertical air grinder, announced by Rotor Tool Co., 17325 Euclid avenue, Cleveland will: Vertical grind large and small castings, giving a flat smooth surface at a speed of 3500 to 5500 rpm with 6 in. cup wheels; sand with 9 in. pads, for finishing sheet metal, smoothing electric welds, etc. at speed of 4500 to 5000 rpm; and wire brush



with 6 in. cup brushes, for smoothing paint, scale, removing burrs, etc., at speed of 3500 rpm.

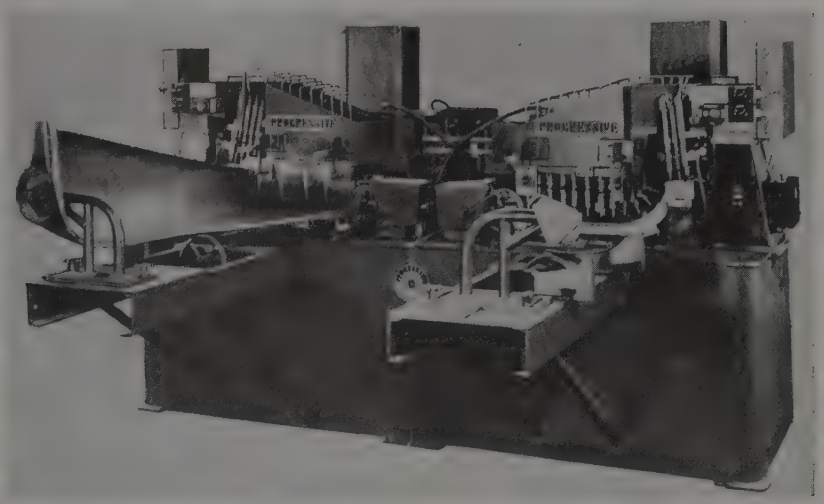
The 12½-lb tool has a height of 8⅛-in., enabling working in close quarters. It has an external blade type rotor motor with twin cylinders. Noise is reduced without loss of power by a new type muffler. Rotor governor idles machine at permissible free speed as determined by the safety code. It opens quickly to deliver full air at high load speed.

2. Hand Operated Air Valve

Utilizing the balanced piston principal, a new line of hand-operated air valves, pistons of which are held in position by air pressure, is introduced by Lindberg

Engineering Co., 2444 West Hubbard street, Chicago 12. Made of cast aluminum alloy, the 3-position, 4-way valve is designed for a 175 lb maximum working pressure.

All inner parts are made of stainless steel and bronze. The 3-position lever (forward, neutral, reverse) permits easy cylinder control by inching, as it is possible to stop cylinder at any given point by placing lever in neutral position.



3. Materials Handling Truck

With low weight and high load factor, materials handling trucks announced by California Pallet Division of Tobey International Co., 7005 South Western avenue, Los Angeles, are offered in three sizes. Easy rolling load rating for all

models is 2000 to 5000 lb, depending on caster size.

Exceptional strength in relation to weight results from design and construction of high tensile aluminum alloy extrusions. Bed of each truck is sufficiently flexible so that load is always supported on four wheels, regardless of rough floor surfaces. Thrust and roller bearing-equipped wheels are permanently lubricated. Special handles or drags are available along with automatic couplings for tractors.

4. Production Welder

That a machine designed for maximum output need not be a single purpose machine is illustrated by a spot welding machine recently designed and built by Progressive Welder Co., Detroit, for welding dust-shields to automobile fenders. Not only will it weld both right and left hand front fenders, but by a simple adjustment, it will handle two different sizes of fenders interchangeably, at a production rate of 150 assemblies per hour, with 18 spot welds per fender.

Machine may be operated at "normal" production by one operator, welding right and left fenders alternately, or two operators, one for right and one for left fenders, virtually doubling production. It is so designed that it can be split into two machines, if desired. Only additional equipment required in such an event would be a second hydraulic power unit.

5. Rotary Pumps

Capacities up to 5 gpm and 100 psi are handled by a line of general service type GA rotary pumps, introduced by Worthington Pump & Machinery Corp., Harrison, N. J. Six sizes are available in various mountings for capacities up to 51 gpm and 100 psi. Features include four bearing construction and special herringbone rotors. Built-in pressure lubrication eliminates danger of liquid contamination.

Models also are made as foot or flange mounted types with adjustable

stuffing box and mechanical seal. Available with or without oversize unloader type relief valve, all models are suitable for direct coupling to electric motors.

6. Polishing, Buffing Lathe

With an overhanging base to provide liberal working space around the wheel, the new model ROL buffing and polishing lathe, built by Hammond Machinery Builders Inc., 1600 Douglas avenue,

Kalamazoo 54, Mich., will accommodate either a 2 or 3 hp motor. Multi-V-belt driven from motor mounted inside base, it may have any one spindle speed from 1200 to 3600 rpm, changeable by replacing motor sheave only. Motor is mounted on hinged motor plate for easy adjustment of belt tension.

7. Indexing Table

Designed to support heavy workpieces without deflection, the model 700 indexing table, manufactured by Kaukauna Machine Corp., Kaukauna, Wis., is adapted for use with their series 125 portable horizontal drilling and tapping machines, as well as other types of ma-

chine tools. It is also suited for inspection or layout work because of its flexibility and rigidity.

Main bed is of heavy well-ribbed cast iron construction, with T-slots provided in the top and at each end for clamping purposes. Work can be held in either horizontal or vertical plane. It is also possible to "setup" on one end of the table while work is being completed at the other end.

Thirty-six-in. diameter indexing platen of the table is manually operated, and may be locked in any position. It is located in the center of main bed, supported by ball thrust bearing. Overall dimensions are 72 in. long by 36¼ in. wide. Table stands approximately 29 in. high.

8. Vertical Pump Motor

A hollow-shaft vertical Tri-Clad induction motor designed for pump drives is announced by General Electric Co., Schenectady, N. Y. Available in ratings from 1 to 500 hp, it is suitable for deep-well turbine pumps, industrial water-

supply projects, mine-dewatering and processing industry liquid pumps.

Motors rated 10 hp at 1800 rpm and larger, are provided with controlled lubrication system, preventing oil-friction loss caused by foaming and churning. Motors 7½-hp at 1800 rpm and smaller are equipped with grease-lubricated bearings.

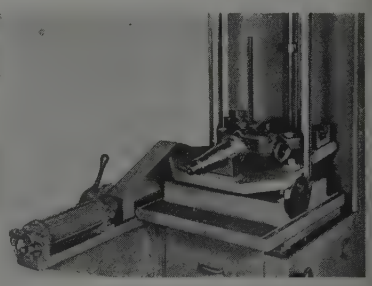
Bearings, punchings and windings are cooled by a double-end ventilation system. A protective coupling prevents damage to the pump or motor caused by motor reversal. Rotor is dynamically balanced to reduce vibration and bearing wear.

9. Broaching Fixture

Fixture operating mechanism designed by Colonial Broach Co., Box 37, Harper Station, Detroit 13, eliminates necessity of manual broach handling, and simplifies broaching of keyway slots in bores of heavy duty steering knuckles. Machine is a 10-ton Colonial utility hydraulic press, equipped with a standard colonial pull-down broaching attachment.

Operation proceeds with broach in "down" position, with an unbroached knuckle placed on the fixture. Handle shown at extreme left of machine is pulled back, causing air cylinder at left to both raise the fixture and move it slightly toward operator. In this position, slotting broach can return through bore of knuckle without dragging. At top of return stroke, lever is flipped and air cylinder returns fixture to starting position. Broach is then pulled down through the bore, cutting the keyway slot.

After broaching first bore in a run of parts, fixture is indexed to position for



second bore. Locating pads, etc., on the fixture for second operation are shown in back of the pull-down attachment guide rods.

10. Shaker Screen

Finished work is quickly separated from the tumbling medium with the portable motor-driven shaker screen developed by Almco Inc., Albert Lea, Minn., for use with deburring and finishing barrels. Driven by a 1/3 or 1/2-hp motor, it vibrates in an elliptical path at

the rate of 380 reciprocations per minute. Length of movement is adjustable from zero to ¾-in.

Interchangeable wire screens are made in standard sizes from 3/64 to 2¼-in. openings. One unit normally serves three or four tumbling barrels, being easily moved from one to another on casters. Overall height of the shaker is 24 in., exclusive of handle.

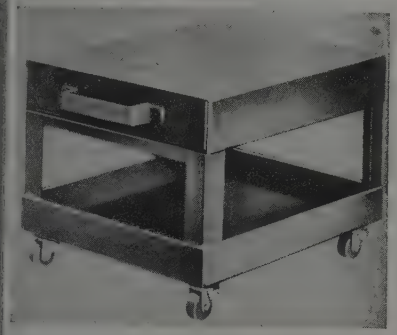
11. Crankshaft Grinder

Landis Tool Co., Waynesboro, Pa., announces the addition of 18 x 30 in. and 18 x 42 in. crankshaft regrinders to its present line. Features of the new machine are: Microsphere wheel spindle bearings; dynamic balancing of rotating parts; variable voltage headstock drive; micrometer wheel feed for accurate sizing; 2-speed hand traverse (hy-

draulic power traverse available as an extra); and equipment to permit plain cylindrical, taper, face or internal grinding.

12. Shop Scooter

H. D. Campbell Co., Rochelle, Ill., recently introduced a 4-wheeled scooter for use anyplace where work requires bending over or kneeling down. Called the Handy Andy scooter, it saves much



worker drudgery—tired legs, tired back and feet. Steel scooter is finished in metallic grey, with shelf at the bottom for tools, books, etc. Small accessories may be stored in a top drawer. Dimensions are 11 in. high, 10 in. wide and 12 in. long. It weighs 10 lb.

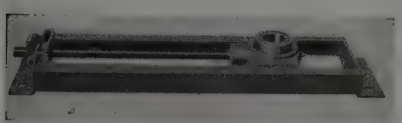
13. Portable Electric Drill

Weighing only 3¾-lb, the model 63 portable electric drill manufactured by Chicago Precision Machine Co., 920 South Michigan avenue, Chicago 5, drills up to ¼-in. steel. Its lightweight, balanced construction reduces operator fatigue and simplifies ease of handling.

Drill is equipped with a 3-jaw Jacobs chuck and has an easy-reach finger point switch and comfortable piston grip. Rubber cable is 12 ft long. It has a free speed of 2000 rpm and operates on 110 v ac-dc.

14. Ball Bearing Take-Up

A steel frame ball bearing take-up for conveyor service is announced by Dodge Mfg. Corp., Mishawaka, Ind. It incorpo-



rates a take-up unit consisting of a ball bearing inner unit enclosed in a cast iron housing provided with ways on each side for supporting guides. Housing is designed to receive the unthreaded end of an adjusting screw.

Equally strong in tension or compression, the take-up has a welded steel frame designed to afford ample strength and rigidity without excess weight. Adjustment is made by turning a brass capatan-head nut. Take-up is offered in shaft sizes from ¾ to 2 7/16-in. inclusive.

15. Squareness-of-Face Gage

Bryant Chucking Grinder Co., Springfield, Vt., announces a gage for checking relationships between pitch diameter of a thread and face of the part. A squareness-of-face type gage, it may be mounted on any Bryant thread gage. It consists of a movable arm which carries

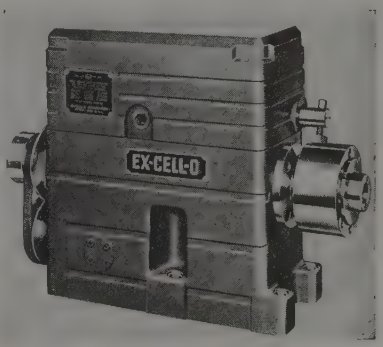
a large dial indicator and two contact points which are adjustable to cover the capacity of the thread gage.

In operation, control lever withdraws thread segments behind guides, part is positioned and the three thread segments are engaged. Part is given one-third of a turn for all-over thread inspection, which is recorded visually on the thread gage dial indicator. Squareness-of-face gage is then swung into position and a half turn more checks the right angularity which is recorded visually on the other dial indicator. Control lever is then actuated, allowing part to be lifted from gage. Various models offered handle capacities from ⅜ to 8 in. internal thread diameter.

FOR MORE INFORMATION
on products and equipment described in this section, fill in a card following page 160.

16. Hydraulic Power Unit

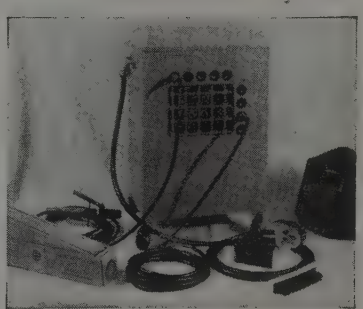
Style 20 hydraulic power unit for high spindle speeds and fast operating cycles, built by Ex-Cell-O Corp., Detroit 6, are easily installed and rearranged when production needs change. Automatic cycle includes rapid approach, two infinitely variable dial adjustable feed rates and rapid return and stop. Unit is arranged for electric start and emergency return control. Only minimum maintenance is required; ordinarily only care necessary is replenishing of hydraulic oil.



Spindle nose has a straight hole with a keyway and set screw. Quill is provided with bolt holes and a pilot diameter for flange mounting to other machining units.

17. Arc Welder

General purpose transformer arc welder for single-phase power lines of limited capacity, is announced by Westinghouse Electric Corp., Pittsburgh. Made in three output ratings—130, 160 and 180 amp—it includes a line breaker, power cable with plug and receptacle, insulated electrode holder, electrode lead with holder



and adjustment plug, work lead with ground clamp and adjustment plug, electrodes, helmet with lens and cover glass and wire brush.

Units offered as models WT-13, WT-16 and WT-18 have 20 steps of current adjustment between 20 amp and the rated maximum, as well as two striking voltages of 65 v for small electrodes on the lower half of the range and 50 v for

larger electrodes on the upper half of the range. De-ion circuit breakers are incorporated to control flow of current to the welder, and to give overload and short-circuit protection. Design of each welder provides adequate natural ventilation.

18. Gas Mixer

Venturi mixer for high pressure gases, known as the Hijector, made by Industrial division of Bryant Heater Co., Cleveland, uses gas under pressures up to 35 lb to entrain all air needed for combustion, and to deliver the mixture to burners at highest possible pressure. By reversing operation of the air shutter and locating it on the body, the orifice spud is accessible for removal without disconnecting any piping.

Air entrainment noise of the mixer is reduced, while orifice and air entrainment areas are readily accessible for inspection or cleaning. The unit is made in pipe sizes from ¾ to 4 in. It is suitable for use with all type of gases.

19. Gravity Conveyor

Island Equipment Corp., 101 Park avenue, New York 17, announced recently a jack knife gravity conveyor—light, portable, adjustable unit which can be raised or lowered from 6 to 52 in. by loosening two wing bolts.

Table may be raised to any height, or if desired one end can be made lower than the other, giving greater or less pitch to table top.

20. Marking Machine

New 9A fixture adaptable to rolling the coupling or other part to be marked as the marking die passes over it is a recent development of Acromark Co., 398 Morell street, Elizabeth 4, N. J. It has an adjustable back plate stop which also acts as a straight-edge. Center block of the fixture carries the turned surface of the coupling or part as it is rolled.

At each end of the adjustment plate is an ear with elongated hole permitting adjustment for coupling sizes by loosening two Allen set screws.

21. Piston Ring Gage

An automatic segregating instrument that inspects compression and oil piston rings rapidly and accurately is announced by Sheffield Corp., Dayton, O. It automatically checks thickness to a tolerance limit of 0.0005-in. and gap width to a tolerance of 0.007 or 0.010-in. It also segregates rings at a rate of 2400 per hour.

After instrument is set up, using piston rings of known minimum and maximum dimensions as masters, rings to be inspected are placed in 3-finger stack holder with gaps arranged to fit the rail on the back finger. This insures all rings passing through the various gaging stations in the same manner.

First gaging station compresses and checks ring for undersize, oversize and within tolerance width gaps, rejecting

it if it is out of tolerance. When gap is correct, ring is checked for thickness. Should it be either oversize or undersize, it passes into either undersize or oversize compartment. If all dimensions are within tolerance limits, piston ring proceeds through all the gaging stations and down a chute into a receptacle for accepted units.

22. Gas Vaporizer

A unit by itself apart from the supply tank, a gas vaporizer for use in industrial LP-gas systems, manufactured by John E. Mitchell Co., Dallas, Tex., operates by using heat in a closed chamber to vaporize gas. Operating with either above or below ground tanks, it draws out chiefly liquid fuel, not losing pressure or frosting up due to heavy withdrawals.

Operation of the vaporizer depends on a principle known as automatic selective control. This relieves unusually heavy demand upon the vaporizer by withdrawing tank gas as needed. Hence excessive pressure cannot build up in vaporizer or tank, and no liquid can enter the vapor line.

23. STANDARD SHAPE DIES

A line of standard square and hexagonal shaped dies with larger bell openings is announced by Carboloy Co. Inc., Detroit. They allow greater latitude in the angle at which stock may enter the dies and permit faster die finishing and servicing, as well as providing more lubrication of both dies and stock. Dies may be finished to cover hole sizes from 5/32 to 1⅝-in. for square dies, and from 5/32 to 1⅞-in. for hexagonal dies. Dies are referred to as the D series.

24. RELIEF VALVES

Superdraulic Corp. of Dearborn, Mich. announces a new 5000 psi relief valve that completely eliminates squealing and chatter characteristic of this type of equipment. Its instantaneous action prevents objectionable pressure peaks. Good hydraulic balance insures high efficiency and long life. Provision is also provided for remote control.

25. HOSE REEL

Lightweight hose reel of the shockproof type for carbon dioxide systems, available in capacities of 50 to 200 lb, is announced by C-O-Two Fire Equipment Co., Box 390, Newark 1, N. J. Reel may be fitted with ½-in. high-pressure hose of any length up to 125 ft, or 100 ft of ¾-in. hose. Handle of nozzle is equipped with "squeeze-grip" valve for controlling discharge of gas.

26. CONTROLLED HEAT KETTLE

Indirectly heated and thermostatically controlled, the Heat-Master double vat kettle model 120-DVP, made by Aeroil Products Co., West New York, N. J., was developed for rubberized asphalt joint sealing compounds. Working on double boiler principle, inner vat contains 115 gal of high flash point heat transfer oil, heated from the inside by an immersion tube system. Melting tank holds 120 gal. Heat is supplied by gas, from bottles mounted on unit or placed nearby.

27. INFRARED LAMPS

Two 125 w infrared industrial lamps are announced by General Electric Lamp Department, Cleveland. One of these is equipped with a G-30 bulb and is for use in open reflector ovens. With a medium skirted base and a 5 in. light center length, it fits infrared reflectors now in use. Other lamp has a R-40 reflector type bulb and medium skirted base. Average laboratory life for both lamps is in excess of 5000 hours.

FOR MORE INFORMATION
on the new products and equipment in this section, fill in this card. It will receive prompt attention.

Helpful Literature

Alloy Castings

eehanite Metal Corp.—8-page illus-d bulletin No. 24 contains series of s items about latest developments in neering applications of Meehanite ngs in industry.

Industrial Equipment

. C. Mahon Co.—12-page illustrated hure covers line of industrial equip-t for surface finishing, air condition-dust collection, drying and baking, eying, pickling, etc. Typical instal-ns are shown.

Roller Bearings

cGill Mfg. Co.—16-page illustrated etin describes No. SM-42A Solidend tirol bearings. Design and construc-features, recommended applications, es of sizes and prices and load ca-ty tables are given. Line of ball ings is also covered briefly.

Color Application

ttsburgh Plate Glass Co.—32-page trated booklet describes scientific use nergy in color and how it can be ap-l to increase efficiency. Resulting cts on health, comfort, morale and y are discussed.

Cutting Tool Salvage

ational Tool Salvage Co.—20-page trated booklet describes service for aging cutting tools. Typical "before" "after" pictures of salvaged tools shop pictures are shown. Advantages savings to be attained are covered.

54. Grinding Wheel Dressing

Koebel Diamond Tool Co.—24-page illustrated booklet entitled "For Grinder Men Only" is nontechnical handbook describing proper methods of using diamond wheel dressing tools. Diamond tools for all industrial purposes are described and blueprints of special holders are offered. Cartoon type illustrations are used.

55. Fastening Devices

Tinnerman Products, Inc.—4-page folder "Application of Spring Tension Fasteners" reveals how assembly engineers can modify and improve parts for more rapid assembly at low cost. Fourteen types of fasteners are shown in 22 different locations in wide range of assemblies.

56. Cleaning & Pickling Cycles

Special Chemicals Div., Pennsylvania Salt Mfg. Co.—4-page leaflet presents instructions on cleaning and pickling cycles for porcelain enamelers. Also described are soak tank cycle and various uses for company's products in porcelain enameling.

57. Magnetic Pulleys

Magnetic Engineering & Mfg. Co.—12-page illustrated catalog No. 146 describes Memco high power magnetic pulleys. Design and construction, table of standard sizes and dimensions, weights, capacities and other data are given for both air cooled and solid types.

58. Hand Pallet Truck

LYON-Raymond Corp.—2-page illustrated bulletin No. 221 describes lightweight hydraulic hand pallet truck. Having capacity to 2000 pounds, truck weighs 225 pounds, is anti-friction bearing equipped and has lift of 4 inches from lowered height of 3¾ inches. Complete data are given.

59. Metal Treating Ammonia

Armour Ammonia Works Div., Armour & Co.—20-page illustrated booklet entitled "Ammonia Installations for Metal Treating" is technical and instructional treatise on use of anhydrous ammonia in treating. Recommended and accepted practices and safety procedures are discussed.

60. Electric Hand Tool

Precise Products Co.—6-page illustrated folder "Precise 40" presents specifications, operating data and application information of lightweight electric hand tool and portable grinder for wide range of industrial uses. Unit is powered by 1/5-horsepower motor, weighs only 40 ounces and operates at up to 40,000 revolutions per minute.

61. Blast Coils

D. J. Murray Mfg. Co.—Illustrated catalog describes Grid blast coils with one-piece high test cast iron construction of fin heating sections. Diagrams of installations, performance charts, temperature differential conversion tables, physical data and specifications are included.

FOR MORE INFORMATION USE ONE OF THESE CARDS...

Please send ☐ Literature ☐ Price information ☐ Nearest source of supply on the items circled at the left.

NAME _____ TITLE _____

COMPANY _____

PRODUCTS MANUFACTURED _____

ADDRESS _____

CITY and ZONE _____ STATE _____

1	16	31	46	61
2	17	32	47	62
3	18	33	48	63
4	19	34	49	64
5	20	35	50	65
6	21	36	51	66
7	22	37	52	67
8	23	38	53	68
9	24	39	54	69
10	25	40	55	70
11	26	41	56	71
12	27	42	57	72
13	28	43	58	73
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3	18	33	48	63
4	19	34	49	64
5	20	35	50	65
6	21	36	51	66
7	22	37	52	67
8	23	38	53	68
9	24	39	54	69
10	25	40	55	70
11	26	41	56	71
12	27	42	57	72
13	28	43	58	73
14	29	44	59	74
15	30	45	60	75

Please send ☐ Literature ☒ Price information ☐ Nearest source of supply on the items circled at the left.

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62. Dieless Duplicating

O'Neil-Irwin Mfg. Co.—40-page illustrated catalog No. 46-10 describes Di-Acro process for dieless duplicating of parts or pieces to die accuracy without delay or expense of dies. System, benders, shears, brakes and methods of use are covered fully.

63. Hydraulic Cylinders

Hanna Engineering Works—32-page illustrated catalog No. 233 describes line of hydraulic cylinders for working pressures up to 1500 pounds per square inch. Engineering, dimensional and specification data are included.

64. Metal Parts

Penn Carbide & Alloy Casting Co.—19-page bulletin No. C-6146 covers sintered carbide products. 8-page catalog No. S-6146 describes steel cast to shape and forged tool steels, their analysis, heat treatment and available types. Bulletin No. N-6146 presents Stellite type alloys and super ferrous alloy precision cast for extreme abrasion resistant applications and wear parts. Bulletin No. E-6146 covers Penn Scribe process developed for engraving and embossing tungsten carbide.

65. Industrial Equipment

Portable Products Corp.—28-page illustrated catalog lists five divisions comprising corporation and industrial products produced by each. Descriptions and illustrations cover such products as safety equipment, process control instruments, electrical devices, metal stampings, and hand and power driven lawn mowers.

66. Fire Protection

American-LaFrance-Foamite Corp.—24-page illustrated educational book entitled "What You Should Know about Modern Fire-Fighting Devices" describes proper use of various types of fire-fighting devices for all classes of fires. Feature of book is proper method of combatting small blazes to keep them from becoming serious.

67. Abrasive Material

Norton Co.—4-page illustrated folder "Norbide Abrasive" describes abrasive material for use in lapping cemented carbide wire, drawing dies and other hard materials. Standard grit sizes available range from 8 to 800.

68. Tube Cutting Tool

Parker Appliance Co.—4-page illustrated folder No. A44 presents description and outlines advantages of hand operated tube cutting tool for use on all metal tubing including steel.

69. Hydraulic Power Equipment

Hydro-Power, Inc. — 4-page illustrated folder outlines hydraulic power equipment for expanding metal, handling strip steel, clamping, lifting, swaging and for special applications. Advantages are cited.

70. Structural Housings

Lindsay Corp.—4-page illustrated folder "The Lindsay Designer" describes structures manufactured and the application of LS structures in wide range of housed products. Panels are available in sizes to meet any requirement.

71. Materials Handling

American Monorail Co.—56-page illu trated bulletin No. C-1 describes featur of design and construction of Monor systems as installed in numerous typ of industrial plants. Manual and pow operated types and auxiliary equipme are covered.

72. Threading Machine

Landis Machine Co.—8-page illu trated bulletin No. E-88-1 presents sp cifications and other pertinent data 4-spindle semiautomatic threading m chine designed for threading automoti parts, bolts, studs and rods on produ tion basis.

73. Industrial Air Filters

American Air Filter Co.—23-page lustrated booklet form No. 502-A di cusses various types of industrial du problems and typical applications of filters to such problems. Chart of siz and characteristics of air-borne solids included.

74. Powder Metallurgy

Keystone Carbon Co.—Revised po der metallurgy catalog includes ne sizes for self-lubricating porous bron bearings for plain, flanged and sel aligning spherical type bearings.

75. Crane Cab Air Conditionin

Lintern Corp.—4-page illustrated bu letin No. AC 111546 describes li of Aire-Rectifiers for crane cab air co ditioning. Case study of installation cab serving soaking pit is outlined. Thr models available for crane cabs up 200-cubic foot capacities are describe

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6	21	36	51	66
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8	23	38	53	68
9	24	39	54	69
10	25	40	55	70
11	26	41	56	71
12	27	42	57	72
13	28	43	58	73
14	29	44	59	74
15	30	45	60	75

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(Sec. 510 P.L.&R.)
Cleveland, Ohio

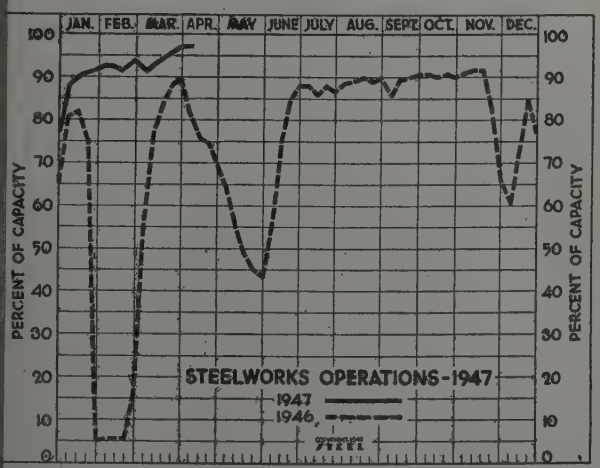
Steel Price Action Deferred Pending Wage Settlement

Leading producer denies rumor of imminent reduction. Token cut possible later with Washington exerting pressure. Steel product extra lists being adjusted and scrap market continues soft. Demand pressure eases in spots

THE STEEL market was in something of a dither last week with the rumor factory working overtime. Substantial across-the-board reduction in base prices was reported under consideration by the United States Steel Corp. and a statement by Benjamin Fairless, president, late in the week, denying such action was in immediate prospect did not entirely squelch the rumors.

Competent market opinion leans to the view "something is doing on prices" considering the pressure being exerted by Washington for downward price adjustments. Even though no immediate steel cut is effected, token reduction of $1 to $2 per ton would not be unlikely, it is reasoned, in event wages are not materially increased, a matter which should be definitely settled within the next three weeks. Such a move, market observers argue, would help tremendously in stemming inflation which has official Washington, and for that matter business and industry, on the anxious seat.

Meanwhile, steel producers continue to revise product extra lists in line with changes recently effected by the Carnegie-Illinois Steel Corp., which resulted in decreases up to $10 per ton on some products. An advance of $4 per ton on spiegeleisen was made last week by Carnegie-Illinois at Pittsburgh, while an eastern plate mill, Central Iron & Steel, announced an increase of $9 per ton in plate prices due to high scrap costs, and U. S. Steel's subsidiary on the West Coast established new bases in that area on sheets and shapes resulting in lower prices to Pacific Coast buyers. Incidentally, easing of several cents per pound on "gray" market steel offerings is reported with consumer buying resistance increasing.



DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended April 5	Change	Same Week 1946	Same Week 1945
Pittsburgh	100.5	— 1	68.5	91.5
Chicago	95	— 1.5	92	101
Eastern Pa.	90.5	None	84	95
Youngstown	91	None	78	93
Wheeling	93.5	None	90.5	93.5
Cleveland	96	+ 2	96.5	93.5
Buffalo	88.5	— 2	90.5	90.5
Birmingham	99	None	95	95
New England	94	None	92	90
Cincinnati	92	+ 5	77	86
St. Louis	75	+ 6	49.5	80
Detroit	90	None	80	90
Estimated national rate	97	None	81.5	96.5

Based on weekly steelmaking capacity of 1,762,381 net tons for 1946; 1,831,636 tons for 1945; 1,791,287 tons for 1944.

Steel scrap prices continue to soften and the recent advance in pig iron appears to have been definitely checked with prices rapidly becoming stabilized. However, steelmaking costs have been adversely affected by a $5 to $7 advance on fireclay silica and ladle brick, and by higher contract prices on certain ferroalloys.

The break in the scrap market, forecast by STEEL five weeks ago, still is under way with most steel mills out of the market. The adjustment downward, however, is orderly. Prices are reported off from $1 to $8 per ton at various points, but, for the most part, are nominal. At Pittsburgh the market on local scrap is unchanged at $38 for heavy melting, but remote material is quoted $1 to $2 lower at $40 to $41.

Demand for steel continues strong, though here and there some easing in pressure is noted. Uncertainty over prices may induce buying hesitancy over the next few weeks. Flat-rolled products are in greatest supply stringency and no easing is likely in the immediate months ahead.

Steel allocations for new freight cars, maintenance and repairs will be upped from 165,000 tons monthly to 210,000 tons beginning with July.

Steel ingot operations held at the record peacetime pace of 97 per cent of capacity last week, despite the coal mine stoppage. Operations rose 6 points in St. Louis and 5 points in Cincinnati to 75 per cent of capacity and 2 points in Cleveland to 96 per cent. In Chicago, production was at 95 per cent, off 1½ points from the published rate for the previous week but an increase of ½ point above the actual rate. Operations were 1 point lower at 100.5 per cent in Pittsburgh and 2 points lower at 85.5 per cent in Buffalo.

STEEL's composite market average eased to $35.67 from $37.50 on steelmaking scrap, while holding unchanged at $69.82 on finished steel, $52.10 on semifinished steel, and $32.49 on steelmaking pig iron.

COMPOSITE MARKET AVERAGES

	Apr. 5	Mar. 29	Mar .22	One Month Ago Mar., 1947	Three Months Ago Jan., 1947	One Year Ago Apr., 1946	Five Years Ago Apr., 1942
Finished Steel	$69.82	$69.82	$69.82	$69.82	$69.53	$63.54	$56.73
Semifinished Steel	52.10	52.10	52.10	52.10	49.45	40.60	36.00
Steelmaking Pig Iron	32.49	32.49	32.49	31.85	29.56	25.50	23.00
Steelmaking Scrap	35.67	37.50	38.00	36.67	31.17	19.17	19.17

Finished Steel Composite:—Average of industry-wide prices on sheets, strips, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; others, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished material (except tin plate) and wire rods, cents per lb; coke, dollars per net ton; others, dollars per gross ton.

Finished Material

	Apr. 5, 1947	Mar., 1947	Jan., 1947	Apr., 1946
Steel bars, Pittsburgh	2.60c	2.60c	2.60c	2.50c
Steel bars, Philadelphia	2.98	2.98	2.98	2 82
Steel bars, Chicago	2.60	2.60	2.60	2.50
Shapes, Pittsburgh	2.50	2.50	2.462	2.35
Shapes, Philadelphia	2 64	2.64	2.602	2.465
Shapes, Chicago	2.50	2.50	2.462	2.35
Plates, Pittsburgh	2.65	2.65	2.612	2.50
Plates, Philadelphia	2.85	2.85	2.777	2 55
Plates, Chicago	2.65	2.65	2.612	2.50
Sheets, hot-rolled, Pittsburgh	2.50	2.50	2.50	2.425
Sheets, cold-rolled, Pittsburgh	3.20	3.20	3.20	3.275
Sheets, No. 10 galv., Pittsburgh	3.55	3.55	3.55	†4.05
Sheets, hot-rolled, Gary	2.50	2.50	2.50	2.425
Sheets, cold-rolled, Gary	3.20	3.20	3.20	3.275
Sheets, No. 10 galv., Gary	3.55	3.55	3.55	†4.05
Hot-rolled strip, Pittsburgh	2.50	2.50	2.50	2.35
Cold-rolled strip, Pittsburgh	3.20	3.20	3.20	3.05
Bright basic, bess. wire, Pittsburgh	3.425	3.425	3.425	3.05
Wire nails, Pittsburgh	4.125	4.125	4.062	3.25
Tin plate, per base box, Pittsburgh	$5.75	$5.75	$5.75	*$5.25

* Nominal. † Base, No. 24 gage.

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$50.00	$50.00	$47.00	$38.00
Slabs, Pittsburgh, Chicago	42.00	42.00	41.25	39.00
Rerolling billets, Pittsburgh	42.00	42.00	41.25	39.00
Wire rods $\frac{7}{32}$ to ¼-inch, Pitts.	2.675c	2.675c	2.675c	‡2.30c

‡ Base, No. 5 to $\frac{9}{32}$-in.

Pig Iron

	Apr. 5, 1947	Mar., 1947	Jan., 1947	Apr., 1946
Bessemer, del. Pittsburgh	$34.83	$34.83	$31.815	$27.69
Basic, Valley	33.00	33.00	30.00	26.00
Basic, eastern del. Philadelphia	35.52	34.26	31.99	27.84
No. 2 fdry., del. Pgh. N. & S. sides	34.33	34.33	31.315	27.19
No. 2 fdry., del. Philadelphia	36.02	34.76	32.49	28.34
No. 2 foundry, Chicago	33.00	33.50	30 50	26.50
Southern No. 2 Birmingham	29.88	29.28	26 88	26.94
Southern No. 2, del. Cincinnati	34.75	34.15	31.75	28.34
Malleable, Valley	33.50	33.50	30 50	26.50
Malleable, Chicago	33.50	32.90	30.50	26.50
Charcoal, low phos., fob Lyles, Tenn.	40.50	40.50	37.50	33.00
Gray forge, del. McKees Rocks, Pa.	33.66	33.66	30.68	26 55
Ferromanganese, fob cars, Pittsburgh	140.25	140.25	140.00	140.00

Scrap

Heavy melting steel, No. 1, Pittsburg	$38.00	$36.80	$32.50	$20.00
Heavy melt. steel, No. 2, E. Pa.	36.00	38.50	31.00	18.75
Heavy melting steel, Chicago	33.00	34.60	30.00	18.75
Rails for rerolling, Chicago	39.00	40.30	35.69	22.25
No. 1 cast, Chicago	42.50	43.10	41.25	20.00

Coke

Connellsville, furnace ovens	$8.875	$8.875	$8.812	$7.50
Connellsville, foundry ovens	10.375	10.375	9.812	8.25
Chicago, by-product fdry., del.	16.10	16.10	15.912	13.75

FINISHED AND SEMIFINISHED IRON, STEEL PRODUCTS

Finished steel quoted in cents per pound and semifinished in dollars per gross ton, except as otherwise noted. Delivered prices do not include the 3 per cent federal tax on freight.

Semifinished Steel

Carbon Steel Ingots: Rerolling quality, standard analysis, price negotiated, fob mill. Forging quality, $40, Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown.

Alloy Steel Ingots: Pittsburgh, Buffalo, Bethlehem, Canton, Massillon, Coatesville, uncrop, $52.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $42; Portsmouth Steel Corp., $55-$60, Portsmouth, O. Detroit, del., $45; eastern Mich., $46.

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $50; Detroit, del., $53; eastern Mich., $54.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $61; del. Detroit $64; eastern Mich., $65.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $50; Portsmouth Steel Corp., $66, Portsmouth, O.

Skelp: Pittsburgh, Sparrows Point, Youngstown, Coatesville, 2.35c per lb.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, $\frac{7}{32}$ to ¼-in., inclusive $2.55-$2.80 per 100 lb. Galveston base, $2.65. Worcester, add $0.10. San Francisco (base, del.), $3.27.

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3-in.: Pittsburgh, Youngstown, Chicago, Gary, Cleveland, Buffalo, Birmingham, Duluth, base, 20 tons one size, 2.60c; Detroit, del., 2.75c; eastern Mich., 2.80c; New York, del., 3.01c; Phila., del., 2 98c, San Francisco (base, del.), 3.33-3.65c; Los Angeles (base, del.), 3.325-3.56c; Seattle, 3.285c, base.

Rail Steel Bars: Price, 2.60c-2.95c, same basing points as merchant carbon bars, except base is 10 tons.

Hot-Rolled Alloy Bars: Pittsburgh, Youngstown, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 3.05c; Detroit, del., 3.20c; eastern Mich., 3.25c. (Texas Steel Co. uses Chicago base price as maximum fob Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base, 20,000-39,999 lb, 3.20c; Detroit, 3.35c; Toledo, 3.40c.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Canton, base, 3.80c; Detroit, del., 3.95c; eastern Mich., 4.00c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base, 2.45c; San Francisco (base, del.), 3.03c; Los Angeles (base, del.), 3.025c; Seattle, 2.985c, base.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo, base, 2.60c-2.95c.

Iron Bars: Single refined, Pittsburgh, 6.15c-†6.70c; double refined, 7.00c-†8.50c; Pittsburgh, staybolt, 7.85c-†10.00c.

† Hand puddled.

Sheets

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base, 2.50c; Detroit, del., 2.65c; eastern Mich., del., 2.70c; Philadelphia, del., 2.70c; New York, del., 2.79c; base, del., 3.245c. (Andrews Steel Co., quotes Middletown, O., base for shipment to Detroit; Alan Wood Steel Co., Conshohocken, Pa., quotes 3.10c, Sparrows Point, Md., base; Granite City Steel Co., 2.875c, fob Granite City, Ill., 2.775c, fob Gary or Birminbham.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.20c; Granite City, base, 3.30c; Detroit, del., 3.35c; eastern Mich., del., 3.40c; New York, del., 3.61c; Philadelphia, del., 3.58c.

Galvanized Sheets, No. 10: Pittsburgh, Chicago, Gary, Birmingham, Youngstown, Sparrows Point, Canton, Middletown, base 3.55c; New York, del., 3.84c; Philadelphia, del., 3.75c; Los Angeles, base, del., 4.32c; San Francisco, base, del., 4.325c.

Corrugated Galvanized Sheets, No. 10: Pittsburgh, Chicago, Gary, Birmingham, base, 3.55c.

Culvert Sheets, No. 16, corrugated: Pittsburgh, Chicago, Gary, Birmingham: Copper alloy, 4.15c; copper-iron or pure iron, 4.50c. Granite City base prices 10 points higher. Los Angeles, base, del., 4.94c; San Francisco, base, del., 4.945c.

Aluminized Sheets, No. 20 hot-dipped, coils or cut to lengths: Pittsburgh, 9.00c.

Long Ternes, No. 10: Pittsburgh, Chicago, Gary, base, 3.55c.

Enameling Sheets, No. 12: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base, 3.55c; Granite City, base, 3.65c; Detroit, del., 3.70c; eastern Mich., 3.75c.

Electrical Sheets, No. 24: Field: Pittsburgh, Chicago, Gary, 4.20c; Kokomo, Ind., 4.30c. Armature: Pittsburgh, Chicago, Gary, 4.50c; Granite City, Ill., Kokomo, Ind., 4.60c. Electrical: Pittsburgh, Chicago, Gary, 5 00c; Granite City, Kokomo, 5.10c. Motor: Pittsburgh, Chicago, Gary, 5.75c; Granite City, 5.85c. Dynamo: Pittsburgh, 6.45; Granite City, 6.55c. Transformer 72, 6.95c; 65, 7.65c; 58, 8.35c; 52. 9.15c, Pittsburgh.

Strip

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Birmingham, Youngstown, base, 2.50c; Detroit, del., 2.65c; eastern Mich., del., 2.70c. (Superior Steel Corp., 3.30c, Pittsburgh.)

Cold-Rolled Strip, 0.25 carbon and less: Pittsburgh, Cleveland, Youngstown, 3.20c; Chicago, base, 3.30c; Detroit, del., 3.35c; eastern Mich., 3.40c; Worcester, base, 3.40c. (Superior Steel Corp., 4.70c, Pittsburgh.)

Cold-Finished Spring Steel: Pittsburgh, Cleveland base: 0.26-0.40 carbon, 3.20c; over 0.40 to 0.60 carbon, 4.70c; over 0.60 to 0.80, 5.30c; add 0.20c for Worcester.

Tin, Terne, Plate

Tin Plate: Pittsburgh, Chicago, Gary, Warren, ., 100-lb base box, $5.75; Granite City, Birmingham, Sparrows Point, $5.85.

Electrolytic Tin Plate: Pittsburgh, Gary, Warren, O., 100-lb base box 0.25 lb tin, $4.85; 0.50 lb tin, $5.05; 0.75 lb tin, $5.25; Granite City, Birmingham, Sparrows Point, $4.95, $5.15, $5.35, respectively.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, Warren, O., base 29-gage and lighter, 2.60c; Granite City, Birmingham, Sparrows Point, 3.70c.

Manufacturing Ternes (Special Coated): Pittsburgh, Chicago, Gary, 100-base box $4.90; Granite City, Birmingham, Sparrows Point, 5.00.

Roofing Ternes: Pittsburgh base per package (112 sheets; 20 x 28 in., coating I. C. 8-lb $13.50; 15-lb $15.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, 2.65c; Coatesville, Claymont, Geneva, Utah, 2.80c; New York, del. 2.94c; Phila., del., 2.85c; St. Louis, del., 2.47c; Boston, del., 2.86c; San Francisco and Los Angeles, del., 3.46-3.52c. Central Iron & Steel Co., Harrisburg, Pa., 2.85c, basing points; Alan Wood Steel Co., Conshohocken, Pa., 2.80c, Coatesville and Claymont equivalent.)

Floor Plates: Pittsburgh, Chicago, 3.90c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, 3.787c; Coatesville, 4.15c.

Clad Steel Plates: Coatesville, 10% cladding: Nickel clad, 21.50c; inconel-clad, 30.00c; monel-clad, 29.00c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.50c; Geneva, Utah, 2.65c; New York, del., 2.70c; Phila., del., 2.64c. Los Angeles, del., 3.17c. Phoenix Iron Co., Phoenixville, Pa., nominally, 2.75c, Bethlehem, Pa., equivalent.)

Steel Piling: Pittsburgh, Chicago, Buffalo, $3 per 100 lb.

Wire and Wire Products

Fob Pittsburgh, Chicago, Cleveland and Birmingham per 100 pounds).

Wire to Manufacturers in carloads

Bright, basic or bessemer .....*$3.30-$3.55
Spring (except Birmingham) **$4.25

Wire Products to Trade

Nails and Staples

Standard and cement-coated.....†$3.75-$4 50
Galvanized .....‡$3.75-$4.50

Wire, Merchant Quality

Annealed (6 to 8 base) ..... §$3.95
Galvanized (6 to 8 base) ..... §$4.40
(Fob Pittsburgh, Chicago, Birmingham, per base column)

Woven fence, 15 gage and heavier .... ††84
Barbed wire, 80-rod spool ..... ††94
Barbless wire, twisted 94
Fence posts (no clamps) ..... ††82
Bale ties, single loop ..... ††86

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* Worcester, $3.40, Duluth, $3.35, base. San Francisco (base, del.) $4.31 for bright basic only.

** Worcester $4.35, Duluth and Trenton, N. J., $4.50, base. San Francisco (base, del.) $5.63 for MB spring wire; $5.28, black premier.

† Worcester $4.05, Cleveland $3.85, base. San Francisco (base del.) $4.83.

‡ Duluth $3.75, Cleveland $3.85, base. San Francisco (base, del.) $4.83.

§ Worcester $4.05, annealed; $4.50, galvanized. Duluth $3.95, annealed; $4.40, galvanized base. San Francisco (base, del.) $4.96, annealed; $5.41, galvanized.

†† San Francisco (base, del.): Woven fence, 107; barbed wire, 114; bale ties, 110. Duluth (base): Woven fence, 84; barbed wire, 94; fence posts, 90.

Rails, Supplies

Rails: Standard, over 60-lb fob mill, $2.50 per 100 lb. Light rails (billet), Pittsburgh, Birmingham, $2.85 per 100 lb; light rails (rail steel), $2.95, Williamsport, Pa.
Relaying, 60 lb and over, fob railroad and basing point, $46-$49 per net ton.

Supplies: Track bolts, 6.50c; heat treated, 6.75c. Tie plates, $2.80 per 100 lb, fob mill; $3.15 base, Seattle. Splice bars, $3 per 100 lb. Standard spikes, 3.65c-4.50c; screw spikes, 5.30-6.40c.

Tubular Goods

Standard Pipe: Base price in carlots, threaded and coupled, to consumers about $200 a net ton. Base discounts Pittsburgh on all types; Lorain on steel butt weld, and seamless; Gary, Ind., 2 points less on steel lap weld and 1 point less on steel butt weld on sizes produced in that district.

Butt Weld

	Steel			Iron	
In.	Blk.	Gal.	In.	Blk.	Gal.
⅛	48	23	½	— 2	+20
¼ & ⅜	51	30½	¾	—11½	+10
½	55½	41	1-1¼	—17	+ 2
¾	58½	45	1½	—22½	— 1½
1-3	60½	47½	2	—23	— 2

Lap Weld

	Steel			Iron	
In.	Blk.	Gal.	In.	Blk.	Gal.
2	53	39½	1¼	— 1	+20
2½-3	56	42½	1½	— 7	+13
3½-6	58	44½	2	—14½	+ 5½
*8	58	42½	2½-3½	—17	+ 1½
*10	57½	42	4	—21	— 4
*12	56½	41	4½-8	—19	— 2½
			9-12	—10	+ 7

* Not T. & C.

Seamless
Steel

In.	Blk.	Gal.	In.	Blk.	Gal.
2	52	38½	*8	57	42
2½-3	55	41½	*10	56½	42
3½-6	57	43½	*12	55½	41

* Not T. & C.

Line Pipe: Base price in carlots to consumers about $200 a net ton. Base discounts Pittsburgh and Lorain, O.

In.	Seamless	In.	Butt Weld
2	51	⅛	47
2½ & 3	54	¼ & ⅜	50
3½ to 8	56	½	54½
10	55½	¾	57½
12	54½	1 to 3	59½

Boiler Tubes: Net base prices per 100 feet, fob Pittsburgh, in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O D.		——Seamless——		—Elec. Weld—	
Sizes	B.W.G.	Hot Rolled	Cold Drawn	Hot Rolled	Cold Drawn
1"	13	....	$10.89	$10.62	$10.62
1¼"	13	....	12.90	10.59	12.58
1½"	13	$12.00	14.26	11.70	13.90
1¾"	13	13.65	16.23	13.31	15.82
2"	13	15.29	18.17	15.00	17.95
2¼"	13	17.05	20.26	16.71	20.00
2¼"	12	18.78	22.31	18.38	22.00
2½"	12	20.57	24.43	20.11	24.07
2¾"	12	21.80	25.89	21.27	25.46
3"	12	22.87	27.18	22.26	26.68
3¼"	11	26.88	31.94	26.15	31.33
3½"	11	28.86	34.30	28.06	33.64
4"	10	35.82	42.55	34.78	41.68
4½"	9	47.48	56.42	....	....
5"	9	54.96	65.30	....	....
6"	7	84.38	100.25	....	....

Pipe, Cast Iron: Class B, 6-in. and over $65 per net ton, Birmingham; $70, Burlington, N. J.; $75.56, del., Chicago; 4-in. pipe, $5 higher, Class A pipe, $3 a ton over class B.

Bolts, Nuts

Fob Pittsburgh, Cleveland, Birmingham, Chicago; add 15c per cwt, Lebanon, Pa. Additional discounts: 5 for carloads; 15 for full containers, except tire, step and plow bolts.

Carriage and Machine Bolts

½-in. and smaller; up to 6 in. in length 55 off
⅝ and ⅝, up to 6 in. in length ..... 52 off
¾ x 6 in. ..... 49 off
⅞ and 1 in. x 6 in. length ..... 51 off
1⅛ in. and larger in all lengths and ⅞ in. and larger in lengths over 6 in. .. 48 off
½ in. and smaller, longer than 6 in. .. 45 off
Tire bolts .....38½ off
Step bolts ..... 46 off
Plow bolts ..... 57 off

Stove Bolts

In packages, nuts separate, 60-10 off; bulk 74 off on 15,000 of 3-in. and shorter, or 5000 over 3-in., nuts separate.

Nuts

Semifinished hexagon	A.S. Light	A.S. Reg. and Heavy
7/16-in. and smaller.....	51 off	.....
½-in. and smaller.....	.....	48 off
½-in.-1-in.	48 off	.....
⅝-in.-1-in.	.....	47 off
1⅛-in.-1½-in.	46 off	45 off
1⅝-in. and larger	.....	44 off

Additional discount of 15 for full containers.

Hexagon Cap Screws

Upset 1-in., smaller (10-20 bright).... 56 off
Upset (10-35 heat treated)
⅝ x 6 ..... 51 off
¾, ⅞, & 1 x 6 ..... 47 off

Square Head Set Screws

Upset 1-in. and smaller ..... 61 off
Headless, ¼-in. and larger ..... 46 off
No. 10 and smaller ..... 56 off

Rivets

Fob Pittsburgh, Cleveland, Chicago
Birmingham

Structural 5.25c
Lebanon, Pa. 5.40c
7/16-in. and under .....55-5 off
Lebanon, Pa. .....55-5 off plus 15c per cwt.

Washers, Wrought

Fob Pittsburgh, Chicago, Philadelphia, to jobbers and large nut and bolt manufacturers, lcl .....$1.50-$2.00 off

Tool Steels

Tool Steel: Pittsburgh, Bethlehem, Syracuse, Canton, O., Dunkirk, N. Y., base, cents per lb; reg. carbon 16.00c; extra carbon 20.00c; special carbon 24.00c; oil-hardening 26.00c; high carbon-chromium 47.00c.

W	Cr	V	Mo	Base, per lb
18.00	4	1	...	74.00c
1.5	4	1	8.5	59.00c
12	3	0.50	..	62.00c
6.40	4.15	1.90	5	63.00c
5.50	4.50	4	4.50	80.00c

Stainless Steels

Base, Cents per lb

Grade	Bars, Drawn Wire, Structurals	Plate	Sheets	Hot Rolled Strip	Cold Rolled Strip
CHROMIUM NICKEL STEELS					
301....	26.00c	29.50c	37.00c	22.00c	28.00c
302....	26 00	29.50	37.00	23.50	30.50
303....	28.50	31.50	39.00	29.50	36.00
304....	27.50	31.50	39.00	25.50	32.50
308....	31.50	37.00	44.50	31.00	38.00
309....	39.00	43.50	51.00	40.50	51.00
310....	53.50	56.50	57.50	53.00	61.00
316....	43.50	48.00	52.00	43.50	52.00
321....	31.50	37.00	44.50	32.00	41.50
347....	36.00	41.50	49.00	36.00	45.50
431....	21.00	24.00	31.50	19.00	24.50
440A ..	26.00	31.00	36.50	26.00	30.50
STRAIGHT CHROMIUM STEEL					
403....	23.50	27.00	32.00	23.00	29.50
410....	20.50	23 50	29.00	18.50	24.00
416....	21.00	24.00	29.50	20.00	25.50
420....	26.00	31.00	36.50	26.00	39.50
430 ...	21.00	24.00	31.50	19.00	24.50
430F ..	21.50	24.50	32.00	20.50	27.00
442....	24.50	28.00	35.50	26.00	35.00
443....	24.50	28.00	35.50	26.00	35.00
446....	30.00	33.00	39.50	38.00	56.50
*501...	9.00	13.00	17.50	13.00	18.50
*502...	10.00	14.50	18.50	14.50	19.50
†STAINLESS CLAD STEEL (20%)					
304....	....	24.00	22.00	....	....
410....	....	22.00	20.00	....	....
430....	....	22.50	20.50	....	....
446....	....	29.00	27.00	....	....

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* Low chromium. † Fob Pittsburgh and Washington, Pa.; plate prices include annealing and pickling.

RAW MATERIAL AND FUEL PRICES

Minimum delivered prices do not include 3 per cent federal tax

Pig Iron

Prices per gross ton

	No. 2 Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$34.50	$34.00	$35.50	$35.00
Newark, N. J., del.	36.34	35.84	37.34	36.84
Brooklyn, N. Y., del.	37.50	....	....	38.00
Birdsboro, Pa., base	34.50	34.00	35.50	35.00
Philadelphia, del.	36.02	35.52	37.02	36.52
Birmingham, base	29.88	29.38	34.50	....
Baltimore, del.	36.28	....	....	....
Chicago, del.	34.12	....	....	....
Cincinnati, del.	34.75	34.25	....	....
Newark, N. J., del.	35.96	....	....	....
Philadelphia, del.	35.13	....	....	....
St. Louis, del.	33.87	33.37	....	....
Buffalo, base	33.00	32.50	34.00	33.50
Boston, del.	39.48	38.98	40.48	39.98
Rochester, del.	34.84	34.34	35.84	35.34
Syracuse, del.	35.50	35.00	36.50	36.00
Chicago, base	33.00	32.50	34.00	33.50
Milwaukee, del.	34.32	33.82	35.32	34.83
Muskegon, Mich., del.	36.83	....	....	37.33
Cleveland, fob furnace	33.00	32.50	34.00	33.50
Akron, del.	35.17	34.17	35.67	35.17
Duluth, base	33.50	33.00	34.50	34.00
Erie, Pa., base	33.00	32.50	34.00	33.50
Everett, Mass., base	29.50	29.00	30.50	30.00
Boston, del.	30.00	29.50	31.00	30.50
Granite City, Ill., base	33.50	33.00	....	33.50
St. Louis, del.	34.25	33.75	....	34.25
†**Neville Island, Pa.,** base	33.50	33.00	34.00	33.50
Pittsburgh, del., N. & S. sides	34.33	33.83	34.83	34.33
Provo, Utah, base	33.50	33.00	....	....
Seattle, Tacoma, Wash., del.	38.60	....	....	....
Portland, Oreg., Del.	38.60	....	....	....
Sharpsville, Pa., base	33.50	33.00	34.00	33.50
Steelton, Pa., base	34.50	34.00	35.50	35.00
Swedeland, Pa., base	35.50	....	36.50	36.00
Troy, N. Y., base	34.50	34.00	35.50	35.00
Toledo, O., base	33.00	32.50	34.00	33.50
Cincinnati, del.	36.50	36.00	....	....
Youngstown, O., base	33.50	33.00	34.00	33.50
Mansfield, O., del.	36.48	35.98	36.98	36.48

† To Neville Island base add: 66c for McKees Rocks, Pa.; $1.01 Lawrenceville, Homestead, McKeesport, Ambridge, Monaco, Aliquippa; 97c (water), Monongahela; $1.33, Oakmont, Verona; $1.49 Brackenridge.

Exceptions to above prices: Kaiser-Frazer Parts Corp., Struthers, O., charges 50 cents a ton in excess of Sharpsville, Pa., basing point price for No. 2 foundry, basic, bessemer and malleable pig iron.

High Silicon Silvery

6.00-6.50 per cent (base).....$40.50
6.51-7.00..$41.50 9.01- 9.50. 46.50
7.01-7.50.. 42.50 9.51-10.00. 47.50
7.51-8.00.. 43.50 10.01-10.50. 48.50
8.01-8.50.. 44.50 10.51-11.00. 49.50
8.51-9.00.. 45.50 11.01-11.50. 50.50

Fob Jackson, O., per gross ton, Buffalo base $1.25 higher. Buyer may use whichever base is more favorable.

Electric Furnace Ferrosilicon: Si 14.01-14.50%, $52.75, Jackson, O.; $56 Keokuk, Iowa. Add $1 a ton for each additional 0.5% Si to 18%; 50c for each 0.5% Mn over 1%; $1 a ton for 0.045% max. phos.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton.

Charcoal Pig Iron

Semi-cold blast, low phosphorus. Fob furnace, Lyles, Tenn.... $40.50 (For higher silicon irons a differential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Gray Forge

Neville Island, Pa. $33.00

Low Phosphorus

Steelton, Pa., Buffalo, Troy, N. Y., Birdsboro, Pa., $39, base; Philadelphia, $41.16, del. Intermediate phosphorus, Central furnace, Cleveland, $36.

Differentials

Basing point prices are subject to following differentials:

Silicon: An additional charge of 50 cents a ton for each 0.25 per cent silicon in excess of base grade (1.75% to 2.25%).

Phosphorus: A reduction of 38 cents a ton for phosphorus content of 0.70 per cent and over.

Manganese: An additional charge of 50 cents a ton for each 0.50 per cent, or portion thereof, manganese in excess of 1%.

Nickel: An additional charge for nickel content as follows: Under 0.50%, no extra; 0.50% to 0.74%, inclusive, $2 a ton; for each additional 0.25% nickel, $1 a ton.

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace..	*$8.75–$9.00
Connellsville, foundry..	9.75–11.00
New River, foundry...	12.50
Wise county, foundry..	11.15
Wise county, furnace..	10.65

* Operators of hand-drawn ovens using trucked coal, $9.35-$9.60.

By-Product Foundry

Kearney, N. J., ovens.	$15.35
Chicago, outside del...	15.10
Chicago, del.	16.10
Terre Haute, del.	15.60
Milwaukee, ovens	15.85
New England, del.	17.25
Birmingham, del.	12.35
Indianapolis, ovens	14.50
Cincinnati, del.	15.35
Ironton, O., ovens	13.35
Painesville, ovens	14.60
Cleveland, del.	15.90
Buffalo, del.	16.10
Detroit, del.	15.75
Philadelphia, ovens	14.50
Portsmouth, O., ovens.	14.00

Coke By-Products

Spot, gal, freight allowed east of Omaha

Pure and 90% benzol	17.00c
Toluol, two degrees	22.00c
Industrial xylol	22.00c
Solvent naphtha	26.00c

Per pound fob works

Phenol (car lots, returnable drums)	11.25c
Do., less than carlots	12.00c
Do., tank cars	10.25c

Eastern plants, per pound

Naphthalene flakes, balls, bbl, to jobbers, "household use"	9.50c

Per ton, bulk, fob plants

Sulphate of ammonia	$30.00

Refractories

Per 1000, fob shipping point Net Prices

Fire Clay Brick

Super Duty

Pa., Mo., Ky.	$87.00

High Heat Duty

Pa., Ill., Md., Mo., Ky.	70.00
Ala., Ga.	70.00
N. J.	75.00

Intermediate Heat Duty

Ohio	64.00
Pa., Ill., Md., Mo., Ky.	64.00
Ala., Ga.	56.00
N. J.	67.00

Low Heat Duty

Pa., Md., Ohio	56.00

Malleable Bung Brick

All bases	80.00

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry Press	47.00
Wire Cut	45.00

Silica Brick

Pennsylvania	70.00
Joliet, E. Chicago	79.00
Birmingham, Ala.	70.00

Magnesite

Domestic dead-burned grains, net ton, fob Chewelah, Wash.

Bulk	24.00
Single bags	28.00

Basic Brick

Net ton, fob Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	59.00
Chem. bonded chrome	59.00
Magnesite brick	81.00
Chem. bonded magnesite	70.00

Ores

Lake Superior Iron Ore

Gross ton, 51½% (Natural) Lower Lake Ports

Old range bessemer	$5.95
Old range nonbessemer	5.80
Mesabi bessemer	5.70
Mesabi nonbessemer	5.55
High phosphorus	5.55

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract	14.00

Foreign Ore

Cents per unit, cif Atlantic ports

N. African low phos.	Nom.
Swedish basic, 60 to 68%	13.00
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% fob Rio de Janeiro	7.50–8.00

Tungsten Ore

Wolframite, per short ton unit, duty paid	$24–$25

Manganese Ore

46-50%, duty paid, fob cars, New York, Philadelphia, Baltimore, Norfolk, Va., Mobile, Ala., New Orleans, 63.00c-67.00c.

Chrome Ore

Gross ton fob cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Oreg., or Tacoma, Wash.

(S S paying for discharge; dry basis, subject to penalties if guarantees are not met.)

Indian and African	
48% 2.8:1	$37.50
48% 3:1	39.00
48% no ratio	31.00
South African (Transvaal)	
44% no ratio	$27-$27.50
45% no ratio	28.00
48% no ratio	30.00
50% no ratio	31.00
Brazilian—nominal	
44% 2.5:1 lump	$33.65
48% 3:1 lump	43.50
Rhodesian	
45% no ratio	$27-$27.50
48% no ratio	30.00
48% 3:1 lump	39.00
Domestic (seller's nearest rail)	
48% 3:1	$39.00

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.78

Fluorspar

Metallurgical grade, fob shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more, $33; 65% to 70%, $32; 60% to 65%, $31; less than 60%, $30.

HIGH-STRENGTH—LOW-ALLOY STEELS

Prices in dollars per 100 pounds

	Pittsburgh	Chicago	Gary	Youngstown	Sparrows Point	Buffalo	Bethlehem	Canton	Massillon
Sheets, Hot-Rolled	3.75–3.85	3.75–3.85	3.75–3.85	3.85	3.85	3.75–3.85	...	...	...
Cold-Rolled	4.55–4.75	4.55–4.75	4.55–4.75	4.75	...	4.55–4.75	...	...	...
Galvanized	5.40	.....	.....	...	...	.....	...	...	...
Strip, Hot-Rolled	3.75–3.85	3.75–3.85	3.75–3.85	3.85	...	.....	...	...	...
Cold-Rolled	4.55	4.65	4.65	4.65	...	.....	...	...	...
Shapes, Structural	3.85	3.85	.....	3.85	...	.....	3.85	...	...
Plates	4.10	4.10	4.10	...	4.10	.....	...	...	...
Bars and Bar Shapes	4.00	4.00	4.00	4.00	...	4.00	...	4.00	4.00

Note: Lower level of quoted ranges represent prices for NAX High Tensile, produced by Great Lakes Steel Corp Detroit.

WAREHOUSE STEEL PRICES

Base prices, cents per pound, for delivery within switching limits, subject to extras

	SHEETS					STRIP		BARS				PLATES	
	H-R 10G	C-R 10G	C-R 17G	Gal. *10G	Gal. *24G	†H-R	C-R	H-R	C-F	H-R Alloy (§4140)	Structural Shapes	Carbon ⅜"-¾"	Floor ⅝" & Thicker
Boston (city)	4.50	....	5.22[4]	6.80[4]	6.80[4]	4.65	6.36	4.62	5.47	7.12	4.47	4.80	6.42
†New York (city)	4.42	....	5.27[8]	5.47[8]	....	4.62	....	4.62	5.42	8.42[12]	4.37	4.72	6.35
New York (country)	4.32	....	5.17[8]	5.37[8]	....	4.52	....	4.52	....	....	4.27	....	6.25
Philadelphia (city)	4.24	5.73[9]	5.33[9]	5.29[5]	6.54[5]	4.43	5.28	4.48	5.38	6.87	4.22	4.40	5.93
Philadelphia (country)	4.14	5.63[9]	5.23[9]	5.19[5]	6.44[5]	4.33	5.18	4.38	....	6.60	4.12	4.30	5.83
Baltimore (city)	4.09	6.15[8]	5.65[8]	5.14[5]	6.39[5]	4.40	....	4.45	5.35	....	4.34	4.39	5.90
Baltimore (country)	3.59	6.05[8]	5.55[8]	....	....	....	....	....	4.85	....	4.24	4.29	5.80
Washington (city)	4.35	....	....	5.18[5]	6.43[5]	4.65	....	4.70	5.60[11]	....	4.60	4.65	6.60
Norfolk, Va.	4.35	....	....	....	....	....	....	4.75	5.50	....	4.50	4.50	6.25
Buffalo (city)	4.00	....	4.70[6]	4.35[5]	....	4.30	4.95	4.05	4.95	....	4.05	4.60	5.90
Buffalo (country)	3.90	....	4.60[9]	4.95[5]	....	3.90	4.60	3.95	4.85	6.60	3.95	4.20	5.45
Pittsburgh (city)	4.00	5.15[8]	4.70[8]	5.05[5]	6.30[5]	4.00	4.95	4.05	4.95	6.60	4.05	4.30	5.55
Pittsburgh (country)	3.90	5.05[8]	4.60[8]	4.95[6]	6.20[5]	3.90	4.85	3.95	4.85	6.60	3.95	4.20	5.45
Youngstown, O. (city)	4.188	5.338	4.888	5.05	6.30	4.00	....	4.238	5.138	....	4.218	4.488	5.178
Youngstown, O. (country)	....	....	....	4.95	6.20	3.90	....	....	....	....	....	....	....
Detroit	4.15	5.30	4.85	5.42	6.67	4.34	5.24	4.20	5.12[13]	7.01	4.42	4.59	5.92
Cleveland (city)	4.00	5.15[8]	4.70[8]	5.238[5]	6.488[5]	4.188	5.05	4.05	4.95	6.858	4.311	4.30	5.811
Cleveland (country)	3.90	5.05[8]	4.60[8]	....	....	3.90	4.95	3.95	4.85	....	....	4.20	....
Cincinnati	4.116	5.266[8]	....	5.166[5]	....	4.394	....	4.403	5.303	....	4.444	4.653	5.944
Chicago (city)	4.00	5.15[8]	4.70[8]	5.05[6]	6.30[5]	4.00	5.05	4.05	4.95	6.60	4.05	4.30	5.70
Chicago (country)	3.90	5.05[8]	4.60[8]	4.95[6]	6.20[5]	3.90	4.95	3.95	4.85	6.60	3.95	4.20	5.60
Milwaukee	4.199	5.349[8]	4.899[8]	5.249[5]	6.499[5]	4.199	5.249	4.249	5.149	6.899	4.249	4.499	5.899
St. Paul	4.384[1]	5.534[8]	5.084[8]	5.434[5]	6.684[5]	4.404[13]	....	4.434[13]	5.726[11]	7.084[11]	4.434[13]	4.684[13]	6.084[13]
Indianapolis	4.04	....	4.84[8]	5.29[5]	6.54[5]	4.24	....	4.36†‡	5.26	....	4.36	4.61	6.01
St. Louis	4.199	....	4.899[9]	....	6.674[5]	4.199	....	4.249	5.32‡[13]	7.074	3.999	3.999	5.999
Birmingham (city)	3.85[20]	....	....	5.20[5]	....	4.10[20]	....	4.05[20]	5.83	....	4.05	4.30	6.56
Birmingham (country)	3.75[20]	....	....	5.20[5]	....	4.00[20]	....	3.95[20]	....	....	3.95	4.20	....
New Orleans	4.46°°	....	5.77[8]	....	....	4.83[20]	....	4.78°°	6.14[11]	....	4.68°°	4.83[20]	6.94[20]
Houston, Tex.	4.50[1]	....	....	....	6.00[12]	5.80[1]	....	°°°	....	....	....	5.60	6.40
Omaha, Nebr.	4.868	6.118[8]	....	5.918[5]	7.168[5]	4.862	....	4.918	5.8‡18[11]	....	4.918	5.168	6.568
Los Angeles	5.55	....	7.10[8]	....	8.10[5]	5.65	8.35	5.10	6.90[19]	7.85	5.20	5.20	7.20
San Francisco	4.90§§	....	6.30[5]	....	7.35[5]	5.20[14]	8.35[14]	4.75[14]	°°°	9.35[16]	4.90[14]	5.00[14]	6.80[14]
Tacoma, Wash.	....	....	....	7.30[5]	....	5.20[17]	....	4.90[17]	6.75[19]	8.95[18]	4.95[17]	5.25[17]	7.25[17]
Seattle	....	....	....	7.30[5]	....	5.20[17]	....	4.90[17]	6.75[19]	8.95[19]	4.95[17]	5.25[17]	7.25[17]

Base Quantities: 400 to 1999 pounds except as noted: Cold-rolled strip, 2000 to 39,999 pounds; cold finished bars, 1000 pounds and over; [1]—any quantity; [2]—300 to 1999 pounds; [3]—150 to 2249 pounds; [4]—three to 24 bundles; [5]—450 to 1499 pounds; [6]—one bundle to 1499 pounds; [7]—one to nine bundles; [8]—400 to 1499 pounds; [9]—1000 to 1999 pounds; [10]—450 to 39,999 pounds; [11]—1000 to 39,999 pounds; [12]—1000 pounds and over; [13]—400 to 14,999 pounds; [14]—400 to 39,999; [15]—2000 lb and over; [16]—1000 to 49,999; [17]—300 to 9999 pounds; [18]—1500 to 1999 pounds; [19]1500 to 39,999; [20]—400 to 3999 pounds.

° Includes gage and coating extra, except Birmingham (coating extra excluded); † does not include gage extras; ‡ basing point cities with quotations representing mill prices plus warehouse spread; § as rolled, except New York, Jersey City, Indianapolis and San Francisco where price represents annealed bars; °° add 0.46 for sizes not rolled in Birmingham; †† same prices quoted for Jersey City, N. J.; ‡‡ add 15c for 100 lb for slow moving items; §§ 18 gage and heavier; °°° rounds under ⅜ in. 7.00c, ⅜ in. and over 6.50c, squares, hexagons and flats 6 in. and narrower 7.50c, flats over 6 in. 8.25c at San Francisco; bar size angles, flats, rounds 5.00c, squares and half ovals 5.15c and bar size channels 5.55c at Houston.

PRICES OF LEADING FERROALLOYS PRODUCTS

Spiegeleisen: 19-21% Mn, 1-3% Si, carlot per gross ton, Palmerton, Pa., $44; Pittsburgh, $48. 16% to 19% Mn, Pittsburgh, $47.

Ferromanganese, standard: 78-82% c.l. gross ton, duty paid, $135 fob cars, Baltimore, Philadelphia or New York, whichever is most favorable to buyer, Birmingham, Ala. (where Sloss-Sheffield Steel & Iron Co. is producer); $140.25 fob cars, Pittsburgh, including 75c switching charge, (where Carnegie - Illinois Steel Corp. is producer); add $8 for packed c.l., $10 for ton, $13.50 for less ton; $1.70 for each 1%, or fraction contained manganese over 82% or under 78%.

Ferromanganese, low carbon: Eastern zone: Special, 21c; regular, 20.50c; medium, 14.50c; central zone: special, 21.30c; regular, 20.80c; medium, 14.80c; western zone: Special, 21.30c; regular, 21.20c; medium, 15.20c. Prices are per pound contained Mn, bulk carlot shipments, fob shipping point, freight allowed. Special low-carbon has content of 90% Mn, 0.10% C, and 0.06% P.

Ferromanganese Briquets: (Weight approx. 3 lb and containing exactly 2 lb Mn) Prices per lb of briquets: Contract, bulk, carlots, 7.00c, packed, carlots, 7.60c, ton lots, 8.00c, smaller lots 8.40c, eastern, freight allowed; 7.25c, 7.85c, 8.60c and 9.00c, central; 7.80c, 8.40c, 10.50c and 10.90c, western; spot up 0.25c; notched, up 0.25c.

Ferrotungsten: Spot, 10,000 lb or more, per lb contained W, $2.10; contract, $2.08; freight allowed as far west as St. Louis.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb contained Ti; ton lots $1.23; smaller lots $1.25; eastern. Spot up 5c per lb.

Ferrotitanium: 20-25%, 0.10 maximum C; per lb contained Ti; ton lots $1.35; smaller lots $1.40 eastern. Spot up 5c per lb.

Ferrotitanium, High-Carbon: 15-20% contract basis, per net ton, fob Niagara Falls, N. Y., freight allowed to destination east of Mississippi river and north of Baltimore and St. Louis, 6.8% C, $142.50; 3-5% C, $157.50.

Ferrovanadium: V 0.35-0.55%, contract basis, per lb contained V, fob producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Ferromolybdenum: 55-75% per lb, contained Mo, fob Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% P content with unitage of $3 for each 1% of P above or below the base; gross tons per carload fob sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Contract, lump, packed; eastern zone quotations: 90-95% c.l. 13.80c, ton lots 14.30c, smaller lots 13.40c; 75%, c.l. 11.05e, ton lots 11.65c, smaller lots 12.25c; 50%, c.l. 9.00c, ton lots 9.65c, smaller lots 10.30c. Deduct 1.00c for bulk, carlots, 80-90% and 90-95%; 1.05c, 75%; 1.20c, 50%. Prices are fob shipping point, freight allowed, per lb of contained Si. Spot prices 0.25c higher on 80-90%, 0.30c on 75%, 0.45c on 50%.

Ferroboron: (B 17.50% max. and C 1.50% max., Al 0.50% max. and C 0.50% max.) Prices per lb of alloy, contract, ton lots $1.20, smaller lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Ferrocolumbium: 50-60%, per lb contained columbium in gross ton lots, contract basis, R. R. freight allowed, eastern zone, $2.50; smaller lots $2.55. Spot up 10c.

Ferrochrome: Contract, lump, packed; **high carbon,** eastern zone, c.l. 16.20c, ton lots 16.80c; central zone, add 0.40c and 1.30c; western zone, add 0.55c and 2.10c. Deduct 0.60c for bulk carlots. **High carbon, high nitrogen,** add 5c to all high carbon ferrochrome prices. Deduct 0.55c for bulk carlots. Spot prices up 0.25c. **Low carbon,** eastern zone, bulk, c.l., max. 0.06% C 23c; 0.1% 22.50c, 0.15% 22.00c, 0.2% 21.75c, 0.5% 21.50c, 1% 21.00c, 2% 20.50c; add 1.35c for 2000 lb to c.l.; central zone add 0.4c for bulk, c.l., and 0.65c for 2000 lb to c.l.; western zone, add 0.5c for bulk, c.l., and 1.85c for 2000 lb to c.l.; carlot packed differential 0.80c. Prices are per lb of contained Cr, freight allowed.

Low carbon, high nitrogen: Add 2c to low carbon ferrochrome prices. For higher nitrogen low carbon, add 2c for each 0.25% of nitrogen over 0.75%.

Ferrochrome, Special Foundry: (Cr 62-66%, C above 5-7%.) Contract, 2-inch x D, packed, eastern zone, freight allowed, c.l. 17.05c, ton lots 17.60c, smaller lots 18.30c; central zone, add 0.40c for c.l. and 1.30c for smaller lots; western zone, add 0.55c for c.l. and 2.10c for smaller lots. Deduct 0.60c for bulk carlots.

S. M. Ferrochrome, high carbon: (Cr 60-65%, Si, Mn and C 4-6% each.) Contract, lump, packed, eastern zone, freight allowed, c.l. 17.30c, ton lots 17.90c, smaller lots 18.60c; central zone, add 0.40c for c.l. and 1.30c for smaller lots; western zone, add 0.55c for c.l. and 2.10c for smaller lots. Prices are per pound of contained chromium, spot prices 0.25c higher. Deduct 0.60c for bulk carlots.

S. M. Ferrochrome, low carbon: (Cr 62-66%, Si 4-6%, Mn 4-6% and C 1.25% max.) Contract, carlot, bulk 21.00c; packed carlot 21.80c, ton lots 22.35c, smaller lots 23.35c, eastern, freight allowed, per pound of contained Cr; 21.40c, 22.20c, 23.00c and 24.00c, central; 21.50c, 22.30c, 24.20c and 25.20c, western; spot up 0.25c.

Ferrochrome Briquets: Containing exactly 2 lb Cr, packed eastern zone, c.l. 10.35c, ton lots 10.75c, smaller lots 11.15c; central zone, add 0.25c for c.l. and 0.90c for smaller lots; western zone, add 0.55c for c.l. and 2.10c for smaller lots. Deduct 0.50c for bulk carlots. Prices per pound of briquets; spot prices 0.25c higher; notched, 0.25c higher.

Chromium Metal: 97% min. Cr, max. 0.50% C, eastern zone, per lb contained Cr bulk, c.l. 79.50c, 2000 lb to c.l. 80c; central 81c and 82.60c; western 82.25c and 84.75c, fob shipping point, freight allowed.

Chromium-Copper: (Cr 8-11%, Cu 88-90%, Fe 1% max., Si 0.50% max.) Contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot up 2c.

Calcium metal; cast: Contract, ton lot or more, $1.60; 100 to 1999 lb, $1.95; less than 100 lb, $3.15 per lb of metal, eastern zone; $1.615, $1.965 and $3.185, western; spot up 5c.

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%), per lb of alloy. Contract, carlots, packed, 16.10c, ton lots 17.60c, smaller lots 18.60c, eastern, freight allowed; 16.60c, 18.45c, 19.45c, central; 18.65c, 20.20c, 21.20c, western; spot up 0.25c.

Calcium - Silicon: (Ca 30-35% , Si

60-65% and Fe 3.00% max.), per lb of alloy. Contract, lump, packed 14.60c, ton lots 16.10c, smaller lots 17.10c, eastern, freight allowed; 15.10c, 16.85c, 17.85c, central; 17.15c, 19.00c, 20.00c, western; spot up 0.25c.

Silicon Metal: Min. 97% Si and max. 1% Fe, eastern zone, bulk, c.l. 14.50c; 2000 lb to c.l. 16.00c; central zone, 15.10c and 18.25c; western, 15.70c and 20.00c; min. 96% Si and max. 2% Fe, eastern, bulk, c.l. 14.10c; 2000 lb to c.l. 15.60c; central 14.70c and 17.85c; western, 15.30c and 19.60c, fob shipping point, freight allowed. Price per lb contained Si.

Silicomanganese Briquets: Containing exactly 2 lb Mn and about ½ lb Si, eastern zone, bulk, c.l. 6.75c, ton lots 7.75c; central zone, add 0.25c for c.l. and 0.60c for ton lots; western, add 0.80c for c.l. and 2.50c for ton lots. Notched, up 0.25c.

Silicon Briquets: Weighing about 5 lb and containing exactly 2 lb Si, packed, eastern zone, c.l. 4.70c, ton lots 5.10c, smaller lots 5.50c; weighing about 2½ lb and containing 1 lb Si, packed, eastern zone, c.l. 4.85c, ton lots 5.25c, smaller lots 5.65c; notched 0.25c higher; central zone, add 0.25c for c.l. and 0.60c for smaller lots; western zone, add 0.45c for c.l. and 0.90c for smaller lots. Prices are fob shipping point, freight allowed; spot prices 0.25c higher. Deduct 0.50c for bulk carlots.

Manganese Metal: (Min. 96% Mn, max. 2% Fe), per lb of metal, eastern zone, bulk, c.l. 30c, 2000 lb to c.l., 32.00c; central 31.00c and 33.45c; western, 31.45c and 34.40c.

Electrolytic Manganese: 99.9% plus, fob Knoxville, Tenn., freight allowed east of Mississippi on 250 lb or more: Carlots 32c, ton lots 34c, drum lots 36c, less than drum lot 38c. Add 1½c for hydrogen-removed metal.

Manganese-Boron: (Mn 75% approx., B 15-20%, Fe 5% max., Si 1.50% max. and C 3% max.) Prices per lb of alloy. Contract, ton lots $1.89, less $2.01, eastern, freight allowed; $1.903 and $2.023, central; $1.935 and $2.055, western; spot up 5c.

Nickel-Boron: (B 15-18%, Al 1% max., Si 1.50% max., C 0.50% max., Fe 3% max, Ni, balance). Prices per lb of alloy: Contract, 5 tons or more $1.90, 1 ton to 5 tons $2.00, smaller lots $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Borosil: 3 to 4% B, 40 to 45% Si; $6.25 per lb contained B, fob Philo, O., freight not exceeding St. Louis rate allowed.

Boriam: B 1.5-1.9%, ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: B 0.90 to 1.15% net ton to carload, 8c per lb, fob Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

Silicaz Alloy: (Si 35-40%, Ca 9-11%, Al 5-7%, Zr 5-7%, Ti 9-11% and B 0.55-0.75%) Prices per lb of alloy, contract, or spot carlots 35.00c, ton lots 37.00c, smaller lots 39.00c, eastern, freight allowed; 35.30c, 38.10c and 40.10c, central; 35.30c, 40.05c and 42.05c, western; spot up 0.25c.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7% and Fe approx. 20%) Prices per lb of alloy, contract, carlots 13.50c, ton lots 14.25c, smaller lots 15.00c, eastern zone, freight allowed; 13.80, 15.35c, 16.10c, central; 13.80c, 17.30c, 18.05c, western; spot up 0.25c.

CMSZ Alloys 4 & 5 (Alloy 4—Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75%, C 3.00-4.50%; alloy 5—Cr 50-56%, Mn 4-6%, Si 13.50-16.00%, Zr 0.75-1.25%, C 3.50-5.00%). Prices per lb of alloy, contract or spot, bulk, carlots 14.50c; packed, carlots 15.25c, ton lots 16.00c, smaller lots 16.75c, eastern, freight allowed; 14.80c, 15.55c, 17.10c, 17.85c, central; 14.80, 15.55c, 19.05c, 19.80c, western.

Zirconium alloy: 12-15%, per lb of alloy, eastern, contract, bulk, carlots 5.50c, packed, carlots 6.05c, ton lots 6.40c, smaller lots 6.75c; spot up 0.25c.

Zirconium alloy: Zr 35-40%, eastern, contract, packed, carlots 17.00c, ton lots 17.75c, smaller lots 19.00c; spot up 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe) Contract basis fob Niagara Falls, N. Y., lump per lb 6.25c; ton lots 6.75c; smaller lots 7.25c. Spot up ½c.

Simanal: (Approx. 20% each Si, Mn, Al) Packed, lump, carload 9c, ton lots 9.25c, smaller lots 9.75c per lb alloy; freight not exceeding St. Louis rate allowed.

Tungsten Metal Powder: Spot, not less than 98.8%, $2.80, freight allowed as far west as St. Louis.

Grainal: Vanadium Grainal No. 1 87.5c; No. 6, 60c; No. 79, 45c; all fob Bridgeville, Pa., usual freight allowance.

Vanadium Pentoxide, technical grade: Fused, approx. 89-92% V_2O_5 and 5.84% Na_2O; or air dried, 83-85% V_2O_5 and 5.15% Na_2O, $1.10 per lb contained V_2O_5 fob plant freight allowed on quantities of 25 lb and over to St. Louis.

Nonferrous Metal Price Tone Firms

Tin rises to 80.00c here while copper, lead and tin move higher abroad

NEW YORK — Undertone of major nonferrous metal markets continues strong which is in sharp contrast to the easier price tone in ferrous markets, particularly scrap. Tin and silver advanced in domestic markets while lead and copper rose in England.

COPPER — E. T. Stannard, president, Kennecott Copper Corp., predicts a copper shortage within the next 12 to 18 months, according to a Salt Lake City dispatch. He was quoted as saying that the country's permanent stockpile almost is depleted compared with one of nearly 600,000 tons at the end of the war. The prospective shortage is attributed to heavy demand for copper from European countries and domestic users.

British Ministry of Supply has advanced maximum selling prices for electrolytic copper £10 a ton to the basis of £137, equivalent to about 24.62c. Industry leaders here concede that on the basis of past experience the price in this country will have to move up to meet the new British quotation.

In the interest of bringing about price stabilization, Kennecott has adopted a firm price policy, replacing the previous practice of billing customers on the basis of price prevailing on day of shipment. This move was given added significance in view of the fact that Congress is expected to temporarily suspend the 4-cent copper tariff, increasing the flow of foreign supplies to this country. A second bill repealing the copper excise tax on foreign copper has been introduced into Congress which, if enacted, would suspend to tax until Mar. 31, 1950.

The domestic market held firm last week on the basis of 21.50c, Connecticut, for electrolytic.

LEAD—The British Ministry of Supply has advanced the maximum price of soft lead £20 per ton to £90, delivered consumers' works in United Kingdom. This advance to the equivalent of 16.17c per pound, based on $4.02½ for sterling, is expected to have little, if any, bearing on the domestic price here which is holding at 15.00c, New York.

American Smelting & Refining Co. has resumed its normal peacetime practice of selling lead for shipment during the present and succeeding month. Previously, the company had been accepting orders for the current month and opening its books for the next month only toward the end of the current month. The trade interpreted this step as a stabilizing influence in the market.

Reconstruction Finance Corp. expects to receive two shipments of scrap lead from Japan about Apr. 5, totaling 1450 metric tons, to be sold on sealed bids, fob dock.

ZINC—The domestic market remained quiet last week with prime western steady at 10.50c, East St. Louis.

TIN—Reconstruction Finance Corp. advanced the price of tin to the basis of 80.00c a pound last week, an increase of 10 cents over the previous level. The price increase follows a new contract with Bolivian producers who will receive an average of 76.00c a pound for the period Apr. 1 to Dec. 31, 1947.

The British Ministry of Supply raised its buying price for Malayan tin concentrates from £370 to £423, ex-smelter, and the price of refined tin from £372 to £426. The new price for Nigerian concentrates is £405 15s, fas Nigerian ports, against the former price of £357 10s. The currency equivalents of the new prices are: Tin concentrates, 76.01c per pound for contained tin; refined Straits, 76.55c. If Malayan tin should be allocated to private interests in the United States, it would be possible to import Straits tin at a little under 80.00c, cif New York.

No change in existing controls on tin and tin mill products is contemplated at present, Civilian Production Administration has advised the tin industry committee. Control has been extended to June 30 by law, including direction 10 to M-21 and orders M-43 and M-81. Under direction 10, which is now inporporated under allocations regulation No. 2, government will continue to channel tin into export for food packaging.

Tin plate shipments under the export program are said to be 10 per cent behind schedule, largely because of transportation difficulties. Export directives include 124,000 tons in the first quarter and 110,000 tons in the second quarter.

Pig tin supplies available in the United States for 1947 delivery are now estimated at not over 69,000 tons, including substantial withdrawals from government stocks. It is expected the tin plate industry will get 32,000 tons this year. Demand for electrolytic tin plate in 1947 is expected to be double that of last year when about 900,000 tons were used, but existing mills lack capacity for meeting that demand.

SILVER—Handy & Harman advanced their "official" price of silver to 75.75c an ounce on fairly good demand from domestic and London buyers.

URANIUM—CPA has dropped its restrictions on the sale and purchase of uranium, uranium compounds and alloys by revocation of conservation order M-285. Control of the supplies of this metal will be assumed by the United States Atomic Energy Commission.

NONFERROUS METAL PRICES

Copper: Electrolytic, carlots 21.50c, del. Conn.; Lake, 21.62½c, del. Conn. Dealers may add ¼c for 5000 lb to carload; 1c, 1000-4999 lb; 1½c, 500-999 lb; 2c, 0-499 lb. Casting, 21.25c, refinery, 20,000 lb or more; 21.50, less than 20,000 lb.

Brass Ingot: 85-5-5-5 (No. 115) 21.50c; 88-10-2 (No. 215) 26.25c; 80-10-10 (No. 305) 24.50c; No. 1 yellow (No. 405) 17.00c; carlot prices, including 25c per 100 lb freight allowance; add ¼c for less than 20 tons.

Zinc: Prime western 10.50c, brass special 10.75c, intermediate 11.00c, E. St. Louis; high grade 11.50c, del., carlots. For 20,000 lb to carlots add 0.15c; 10,000-20,000 lb 0.25c; 2000-10,000 lb 0.4c; under 2000 lb 0.50c.

Lead: Common 14.80c-14.85c, chemical 14.90c, corroding 14.90c, E. St. Louis for carlots.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lb and over; add ½c 2000-9999 lb; 1c less through 2000 lb.

Secondary Aluminum: Piston alloy (No. 122 type) 16.37½c; No. 12 foundry alloy (No. 2 grade) 15.62½c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1 (95-97½%) 17.00c; grade 2 (92-95%) 16.00c; grade 3 (90-92%) 15.25c; grade 4 (85-90%) 14.75c. Above prices for 30,000 lb or more; add ¼c 10,000-30,000 lb; ½c 5000-10,000 lb; ¾c 1000-5000 lb; 1¼c less than 1000 lb. Prices include freight at carload rate up to 75c per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lb) 20.50c per lb, carlots; 22.50c 100 lb to c.l. Extruded 12-in. sticks 34.00c-38.00c.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lb, 1½c 1000-2239, 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 80.00c.

Antimony: American bulk carlots fob Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 33.00c, 99.8% and over (arsenic, 0.05% max.; other impurities, 0.1% max.) 33.50c, effective as of Mar. 15. On producers' sales add ¼c for less than carload to 10,000 lb; ½c for 9999-224 lb; add 2c for 223 lb and less; on sales by dealers, distributors, and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked 35c lb; 25 lb pigs produced from electrolytic cathodes 36.50c lb; shot produced from electrolytic cathodes 37.50c lb; "F" nickel shots or ingots for additions to cast iron 35.50c lb. Prices include import duty.

Mercury: Open market, spot, New York, $86-$90 per 76-lb flask.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be, $14.75 per lb contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks, and all other "regular" straight or flat forms $1.75 lb, del.; anodes, balls, discs and all other special or patented shapes, $1.80.

Cobalt: 97-98%, $1.50 lb for 550 lb (keg); $1.52 lb for 100 lb (case); $1.57 lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Indium: 99.9%, $2.25 per troy ounce.

Silver: Open market, N. Y., 75.75c per ounce.

Platinum: $57-$61 per ounce.

Palladium: $24 per troy ounce.

Iridium: $96 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass products prices based on 21.50c, Conn., for copper. Freight prepaid on 100 lb or more.)

Sheet: Copper 32.93c; yellow brass 28.88c; commercial bronze, 95% 32.97c, 90% 32.36c; red brass, 85% 31.24c, 80% 30.63c; best quality 29.89c; Everdur, Duronze, Herculoy or equiv., cold-drawn, 37.71c; nickel silver, 18%, 41.54c; phosphor bronze, grade A, 5%, 50.75c.

Rods: Copper, hot rolled 29.28c, cold drawn 30.28c; yellow brass, free cutting, 23.64c, not free cutting 28.57c; commercial bronze, 95% 32.66c, 90% 32.05c; red brass, 85% 30.93c, 80% 30.32c; best quality 29.58c.

Seamless Tubing: Copper 32.97c; yellow brass 31.64c; commercial bronze 90% 34.77c; red brass 85% 33.90c, 80% 33.29c; best quality brass 32.30c.

Copper Wire: Bare, soft, fob eastern mills, carlots 27.72c, less carlots 28.22c; weatherproof, fob eastern mills carlot 28.12c, less carlots 28.62c; magnet, delivered, carlots 31.13c, 15,000 lb or more 31.38c, less carlots 31.88c.

Aluminum Sheets and Circles: 2s and 3s flat mill finish, base 30,000 lb or more del.; sheet widths as indicated; circle diameter 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers: Sheets, full rolls, 140 sq ft or more, 18.25c; add per hundredweight, 25c, 80 to 140 sq ft; 50c, 20 to 80 sq ft; 75c, 10 to 20 sq ft and circles.
Pipe: Full coils 17.50c; cut coils 17.75c.
Lead Traps and Bends: List plus 42%.

Zinc Products: Sheet, 15.50c, fob mill, 36,000 lb and over. Ribbon zinc in coils, 14.50c, fob mill, 36,000 lb and over. Plates, not over 12-in., 13.50c; over 12-in., 14.50c.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads, 20.00c; 5 tons and over, 25.00c; 1 to 5 tons, 21.00c; less than 1 ton, 21.50c.

Copper Anodes: Base, 2000 to 5000 lb; fob shipping point, freight allowed: Flat untrimmed, 29.84c; oval, 29.34c; electro-deposited, 29.09c; cast, 28.84c.

Copper Carbonate: 52-54% metallic Cu, 250 lb barrels, nom.

Copper Cyanide: 70-71% Cu, 100-lb kegs or bbls, 41.50c fob Niagara Falls.

Sodium Cyanide: 96-98%, ½-oz balls, in 100 or 200 lb drums, 1 to 400 lb, 16.00c, 500 lb and over, 15.00c, fob Cleveland; 1 cent less, fob Niagara Falls.

Nickel Anodes: Cast and rolled carbonized, carloads, 48.00c; 10,000 to 30,000 lb, 49.00c; 30,000 to 10,000 lb, 50.00c; 500 to 3000 lb, 51.00c; 100 to 500 lb, 53.00c; under 100 lb, 56.00c; add 1 cent for rolled depolarized.

Nickel Chloride: 100-ib kegs, 22.00c; 275-lb bbls, 22.00c.

Tin Anodes: Bar, 1000 lb and over 82.50c; 500 to 1000 lb, 83.00c; 200 to 500 lb, 83.50c; less than 200 lb, 84.00c; ball, 1000 lb and over, 84.75c, 500 to 1000 lb, 85.25c, 200 to 500 lb, 85.75c; less than 200 lb, 86.25c, fob Sewaren, N. J.

Tin Chloride: 400 lb bbls, nom., fob Grasselli, N. J.; 100 lb kegs, nom.

Sodium Stannate: In 100 or 200 lb drums, 49.00c; 4 to 11 kegs, 47.00c; 12 to 20 kegs, 44.30c; 21 kegs and over, 43.50c; in 350-lb bbl, 46.50c; 4 to 5 bbls, 43.80c; 6 bbls and over, 43.00c; fob Chicago, freight allowed east of Mississippi on 100 lb and over.

Zinc Cyanide: 100-lb drums, 35.00c, fob Cleveland; 34.00c, fob Niagara Falls.

Scrap Metals

BRASS MILL ALLOWANCES

Prices for less than 15,000 lb fob shipping point. Add ⅝c for 15,000-40,000 lb; 1c for 40,000 or more.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	19.125	19.125	18.375
Yellow brass	15.125	14.875	14.250
Commercial Bronze			
95%	18.000	17.750	17.250
90%	17.500	17.250	16.750
Red brass			
85%	17.250	17.000	16.500
80%	16.875	16.625	16.125
Best Quality (71-79%)	16.125	15.875	15.375
Muntz Metal	14.125	13.875	13.375
Nickel silver, 5%	16.125	15.875	8.063
Phos. bronze, A. B.	20.000	19.750	18.750
Naval brass	14.500	14.250	13.750
Manganese bronze	14.500	14.250	13.625

BRASS INGOT MAKERS BUYING PRICES

(Cents per pound, fob shipping point, carload lots)

No. 1 copper 18.00, No. 2 copper 17.00, light copper 16.00, composition red brass 16.75, auto radiators 13.25, heavy yellow brass 12.00, brass pipe 12.00.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper, 19.25-19.50; No. 2 copper, 17.75-18.50, light copper 16.75-17.50; refinery brass (60% copper), per dry copper content less $5 smelting charge for brass analyzing 60 per cent or more, 17.62½c.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots or more)

Copper and Brass: Heavy copper and wire, No. 1 16.50-17.00; No. 2 15.50-16.00; light copper 14.25-14.75; No. 1 composition red brass 14.25-14.50, No. 1 composition turnings 14.00-14.25, mixed brass turnings 9.75-10.00, new brass clippings 12.50-13.00, No. 1 brass rod turnings 11.75-12.25, light brass 8.50-9.00, heavy yellow brass 9.75-10.00, new brass rod ends 12.00-12.50, auto radiators, unsweated 11.50-12.00, clean red car boxes 12.50-13.00, cocks and faucets 11.25-11.50, brass pipe 11.00-11.50.

Lead: Heavy lead 12.50, battery plates 7.50-7.75, linotype and stereotype 13.50-14.00, electrotype 11.50-12.00, mixed babbitt 12.00-12.50, solder joints 13.50-14.00.

Zinc: Old zinc 5.50-6.00, new die cast scrap 4.50-5.00, old die cast scrap 3.50-4.00.

Tin: No. 1 pewter 44.00-45.00, block tin pipe 60.00-62.00, auto babbitt 35.00-36.00, No. 1 babbitt 35.00-38.00, siphon tops 38.00-40.00.

Aluminum: Clippings, 2S, 9.00-9.50, old sheets 7.00-7.50, crankcase 7.00-7.50, borings and turnings 3.00, pistons, free of struts, 6.75-7.00.

Nickel: Anodes 19.50-20.50, turnings 16.50-17.50, rod ends 19.00-20.00.

Monel: Clippings 14.00-15.00, turnings 9.00, old sheet 12.00-13.00, rods 12.50-13.00, castings 10.00.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Prices are dollars per gross ton, including broker's commission, delivered at consumer's plant except where noted.

PITTSBURGH:

Prices for open hearth grades from remote points range from $40 to $42; on electric furnace grades, $40 to $42, depending on freight. Prices for all steelmaking grades, both for local and remote material, temporarily nominal.

No. 1 Heavy Melt. Steel	$38.00
No. 2 Heavy Melt. Steel	38.00
No. 1 Busheling	38.00
Nos. 1, 2 & 3 Bundles.	38.00
Machine Shop Turnings	30.00-31.00
Mixed Borings, Turnings	30.00-31.00
Short Shovel Turnings.	32.00-33.00
Cast Iron Borings	31.00-32.00
Bar Crops and Plate	44.00-45.00
Low Phos. Cast Steel	43.00-44.00
Punchings & Plate Scrap	44.00-45.00
Elec. Furnace Bundles.	43.00-44.00
Heavy Turnings	37.00-38.00
Alloy Free Turnings	33.50-34.50
Cut Structurals	44.00-45.00
No. 1 Chemical Borings	34.50-36.50

Cast Iron Grades

No. 1 Cupola	43.50-44.50
Charging Box Cast	39.00-39.50
Heavy Breakable Cast.	37.50-38.50
Stove Plate	42.00-43.00
Unstripped Motor Blocks	42.00-43.00
Malleable	46.00-47.00
Brake Shoes	35.00-36.00
Clean Auto Cast	43.50-44.50
No. 1 Wheels	45.00-46.00
Burnt Cast	35.00-36.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	38.00
R.R. Malleable	48.00-49.00
Axles	44.00-45.00
Rails, Rerolling	41.00-42.00
Rails, Random Lengths	38.00-39.00
Rails, 3 ft and under.	42.00-43.00
Rails, 18 in. and under.	45.00-46.00
Railroad Specialties	44.00-45.00
Uncut Tires	44.00-45.00
Angles, Splice Bars	42.00-43.00

CLEVELAND:

No. 1 Heavy Melt. Steel	$35.00-35.50
No. 2 Heavy Melt. Steel	35.00-35.50
No. 1 Busheling	35.00-35.50
Nos. 1 & 2 Bundles	35.00-35.50
Machine Shop Turnings	28.50-29.00
Mixed Borings, Turnings	29.50-30.00
Short Shovel Turnings.	29.50-30.00
Cast Iron Borings	29.50-30.00
Bar Crops and Plate	40.00-40.50
Cast Steel	40.00-40.50
Punchings & Plate Scrap	40.00-40.50
Elec. Furnace Bundles.	38.00-38.50
Heavy Turnings	36.00-36.50
Alloy Free Turnings	30.50-31.00
Cut Structurals	40.00-45.00
No. 1 Chemical Borings	33.00

Cast Iron Grades

No. 1 Cupola	46.00-50.00
Charging Box Cast	42.00
Stove Plate	45.00
Heavy Breakable Cast.	44.00-46.00
Unstripped Motor Blocks	45.00
Malleable	50.00
Brake Shoes	43.00
Clean Auto Cast	50.00
No. 1 Wheels	43.00
Burnt Cast	42.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	37.50-38.00
R.R. Malleable	45.00-50.00
Rails, Rerolling	48.00-50.00
Rails, Random Lengths	45.00-48.00
Rails, 3 ft and under	50.00
Railroad Specialties	45.00
Uncut Tires	44.00
Angles, Splice Bars	48.00

VALLEY:

No. 1 Heavy Melt. Steel	$35.50-36.00
No. 2 Heavy Melt. Steel	35.50-36.00
No. 1 Bundles	35.50-36.00
Machine Shop Turnings	29.00-29.50
Short Shovel Turnings.	30.00-30.50
Cast Iron Borings	30.00-30.50

Railroad Scrap

No. 1 R.R. Heavy Melt.	38.00

MANSFIELD:

No. 1 Heavy Melt. Steel	$35.50-36.00
Machine Shop Turnings	29.00-29.50
Short Shovel Turnings.	32.50-33.00

CINCINNATI:

No. 1 Heavy Melt. Steel	$35.00
No. 2 Heavy Melt. Steel	35.00
No. 1 Busheling	35.00
No. 1 Bundles	35.00
No. 2 Bundles	35.00
Machine Shop Tunings.	28.00
Mixed Borings, Turnings	26.00
Short Shovel Turnings.	29.00
Cast Iron Borings	29.00

Cast Iron Grades

No. 1 Cupola Cast	44.00
Charging Box Cast	37.00
Heavy Breakable Cast.	38.00
Stove Plate	33.00
Unstripped Motor Blocks	36.00
Brake Shoes	32.00
Clean Auto Cast	43.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	37.00
R.R. Malleable	46.00
Rails, Rerolling	41.00
Rails, Random Lengths.	41.00
Rails, 18 in. and under.	46.00

DETROIT:

(Dealers buying prices, fob shipping point)

No. 1 Heavy Melt. Steel	$34.50-35.00
No. 1 Busheling	34.50-35.00
Nos. 1 & 2 Bundles	34.50-35.00
No. 3 Bundles	34.50-35.00
Machine Shop Turnings.	26.00-26.50
Mixed Borings, Turnings	26.00-26.50
Short Shovel Turnings.	27.00-27.50
Cast Iron Borings	27.00-27.50
Punchings & Plate Scrap	37.00-38.00

Cast Iron Grades

No. 1 Cupola Cast	$39.00-42.00
Heavy Breakable Cast.	33.00-35.00
Clean Auto Cast	39.00-42.00

BUFFALO:

No. 1 Heavy Melt. Steel	$35.00-37.00
No. 2 Heavy Melt. Steel	35.00-37.00
No. 1 Busheling	35.00-37.00
Nos. 1 & 2 Bundles	35.00-37.00
Machine Shop Turnings	28.00-29.00
Mixed Borings, Turnings	28.00-29.00
Short Shovel Turnings.	30.00-31.00
Cast Iron Borings	27.00-28.00
Punchings & Plate Scrap	34.00-35.00
Elec. Furnace Bundles.	33.00-38.00
Alloy Free Turnings	31.00-32.00

Cast Iron Grades

Charging Box Cast	38.00-39.00
Heavy Breakable Cast.	37.00-38.00
Stove Plate	43.00-44.00
Malleable	40.00-41.00
Clean Auto Cast	38.00-39.00
No. 1 Wheels	38.00-39.00

PHILADELPHIA:

No. 1 Heavy Melt. Steel	$36.00
No. 2 Heavy Melt. Steel	36.00
No. 1 Busheling	36.00
No. 1 & No. 2 Bundles.	36.00
No. 3 Bundles	34.00
Machine Shop Turnings	26.00-27.00
Mixed Borings, Turnings	23.00-24.00
Short Shovel Turnings.	27.50
Bar Crops and Plate	40.00-41.00
Cast Steel	41.50-42.50
Punchings & Plate Scrap	40.00-41.00
Elec. Furnace Bundles.	37.00
Heavy Turnings	38.00-39.00
Cut Structurals	40.00-41.00
No. 1 Chemical Borings	31.50-32.00

Cast Iron Grades

No. 1 Cupola Cast	49.00-51.00
Charging Box Cast	47.00-47.50
Heavy Breakable Cast.	46.50-47.00
Unstripped Motor Blocks	44.00-44.50
Malleable	50.00-51.00
Clean Auto Cast	49.00-51.00
No. 1 Wheels	47.00-49.00

NEW YORK:

(Dealers buying prices, fob shipping point)

No. 1 Heavy Melt. Steel	$32.25-32.75
No. 2 Heavy Melt. Steel	32.25-32.75
No. 1 Busheling	32.25-32.75
Nos. 1 & 2 Bundles	32.25-32.75
No. 3 Bundles	30.25-30.75
Machine Shop Turnings.	20.50-21.00
Mixed Borings, Turnings	20.50-21.00
Short Shovel Turnings.	24.50-25.00
Punchings & Plate Scrap	35.00-35.50
Elec. Furnace Bundles.	33.25-33.75
Cut Structurals	35.00-35.50
No. 1 Chemical Borings	25.00

Cast Iron Grades

No. 1 Cupola Cast	41.50-42.00
Charging Box Cast	40.50-41.00
Unstripped Motor Blocks	41.50-42.00
Malleable	48.00-49.00

BOSTON:

(Fob shipping point)

No. 1 Heavy Melt. Steel	$29.00-30.00
No. 2 Heavy Melt. Steel	29.00-30.00
No. 1 Busheling	29.00-30.00
Nos. 1 & 2 Bundles	29.00-30.00
Machine Shop Turnings	22.00-23.00
Mixed Borings, Turnings	20.00-21.00
Short Shovel Turnings.	22.00-23.00
Bar Crops and Plate	33.00-34.00
Punchings & Plate Scrap	32.00-33.00
Chemical Borings	24.00-25.00

Cast Iron Grades

No. 1 Cupola Cast	42.00-45.00
Charging Box Cast	40.00-42.00
Heavy Breakable Cast.	42.00-44.00
Stove Plate	39.00-40.00
Clean Auto Cast	44.00-46.00

CHICAGO:

Prices for open hearth, electric furnace and foundry grades from remote points range several dollars per ton higher, depending on freight charges.

No. 1 Heavy Melt. Steel	$32.50-33.00
No. 2 Heavy Melt. Steel	32.50-33.00
Nos. 1 & 2 Bundles	32.50-33.00
No. 3 Bundles	30.50-31.00
Machine Shop Turnings	27.00-28.00
Mixed Borings, Turnings	27.00-28.00
Short Shovel Turnings.	28.00-30.00
Cast Iron Borings	28.00-29.00
Bar Crops and Plate	35.00-35.50
Cast Steel	35.00-35.50
Punchings	35.00-35.50
Elec. Furnace Bundles.	33.50-34.00
Heavy Turnings	32.00-32.50
Cut Structurals	34.50-35.00

Cast Iron Grades

No. 1 Cupola Cast	40.00-45.00
Malleable	40.00-45.00
Clean Auto Cast	40.00-45.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	33.50-34.00
Rails, Rerolling	38.00-40.00
Rails, Random Lengths	36.00-38.00
Rails, 3 ft. and under.	41.00-43.00
Rails, 18 in. and under	42.00-44.00
Railroad Specialties	39.00-41.00
Angles, Splice Bars	39.00-41.00

ST. LOUIS:

No. 1 Heavy Melt. Steel	$35.50-36.50
No. 2 Heavy Melt. Steel	35.50-36.00
Machine Shop Turnings	27.25-27.75
Short Shovel Turnings.	29.25-29.75

Cast Iron Grades
(Fob shipping point)

No. 1 Cupola Cast	40.00-42.00
Charging Box Cast	30.00-35.00
Heavy Breakable Cast.	30.00-32.00
Stove Plate	29.00-34.00
Brake Shoes	28.75-31.00
Clean Auto Cast	35.00-37.00
No. 1 Wheels	34.50-36.50
Burnt Cast	25.00-30.00

Railroad Scrap

R.R. Malleable	41.00-42.00
Rails, Rerolling	40.00-42.00
Rails, Random Lengths	39.00-42.00
Rails, 3 ft and under	40.00-43.00
Uncut Tires	34.50-36.50
Angles, Splice Bars	38.00-40.00

BIRMINGHAM:

No. 1 Heavy Melt. Steel	$36.00
No. 2 Heavy Melt. Steel	36.00
No. 1 Busheling	36.00
Nos. 1 & 2 Bundles	32.50-33.00
Long Turnings	24.00-25.00
Short Shovel Turnings.	27.50-28.00
Cast Iron Borings	25.00
Bar Crops and Plate	38.00-38.50
Punchings & Plate Scrap	34.00-34.50
Cut Structurals	35.00-36.00

Cast Iron Grades

No. 1 Cupola Cast	39.00-40.00
Stove Plate	35.00-36.00
No. 1 Wheels	38.00-39.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	29.50-30.00
R.R. Malleable	37.50-38.00
Axles, Steel	35.50-36.00
Rails, Rerolling	41.00-42.00
Rails, Random Length.	33.00-34.00
Rails, 3 ft and under	36.00-37.00
Angles and Splice Bars	37.00-38.00

SAN FRANCISCO:

No. 1 Heavy Melt. Steel	*$19.04
No. 2 Heavy Melt. Steel	*19.04
No. 1 Busheling	*19.04
Nos. 1 & 2 Bundles	*19.04
No. 3 Bundles	*17.04
Machine Shop Turnings	*12.54
Bar Crops and Plate	18.00
Cast Steel	18.00
Alloy Free Turnings	8.00
Cut Structurals	20.00-20.50
Tin Can Bundles	17.00

Railroad Scrap

Axles	26.50
Rails, Random Lengths.	21.00
Uncut Tires	26.00

* Fob California shipping point.

SEATTLE:

No. 1 Heavy Melt. Steel	$20.00
No. 2 Heavy Melt. Steel	20.00
No. 1 Busheling	20.00
Nos. 1 & 2 Bundles	20.00
No. 3 Bundles	18.00
Machine Shop Turnings	11.50
Mixed Borings, Turnings	11.50
Punchings & Plate Scrap	21.50
Cut Structurals	21.50

Cast Iron Grades

No. 1 Cupola Cast	27.50
Charging Box Cast	22.50
Heavy Breakable Cast.	21.50
Stove Plate	25.50
Unstripped Motor Blocks	21.50
Malleable	27.50
Brake Shoes	27.50
Clean Auto Cast	27.50
No. 1 Wheels	24.00

Railroad Scrap

No. 1 R.R. Heavy Melt	20.00
Railroad Malleable	27.50
Rails, Random Lengths	20.00
Angles and Splice Bars	21.50

LOS ANGELES:

No. 1 Heavy Melt. Steel	$17.50
No. 2 Heavy Melt. Steel	16.50
Nos. 1 & 2 Bundles	16.00
Machine Shop Turnings	10.00
Mixed Borings, Turnings	10.00

Cast Iron Grades

No. 1 Cupola Cast	30.00

Sheets, Strip . . .

Second quarter opens with demand still far in excess of supply

Sheet Prices, Page 164

New York — Several sheet sellers have entered the new quarter with shipments lagging from a month to six weeks behind schedule. On an average, this represents an improvement over the beginning of the first quarter. The situation with respect to hot and cold-rolled sheets, galvanized and enameling stock, is so little improved as not to make much difference. In stainless steel sheets, sellers generally are current and most are in position to make shipments against new orders within two months.

Excepting for stainless steel and possibly one or two other specialties, demand is far in excess of supply, although there is less pressure for new tonnage because consumers realize the sold-up condition of the mills. There is pressure, nevertheless, where sellers are behind on their commitments.

Also, there is pressure from fabricators engaged in housing work, who have no regularly established sources of supply, but who over recent months have been receiving steel under government allocations, which with the beginning of this quarter are no longer in effect. Sheet producers have agreed voluntarily to supply the same amount of sheets in second quarter for critical housing work that they supplied in the first quarter. They have not necessarily committed themselves, however, to supply each consumer on the same basis as heretofore.

Various consumers got more under government allocation than they actually needed for the housing schedules set up. In some cases at least, a portion of the sheets went into other products and the black market. Intent upon eliminating this situation, producers are much more cautious in their allocations, now that the responsibility is theirs, and in the case of consumers who have not been regular customers, they are disposed to pass them by, even though under government allocations they have been supplying them. Complaints from these consumers continue to go into Washington, with the possibility that some relief will be provided where it can be definitely shown that their requirements are essential.

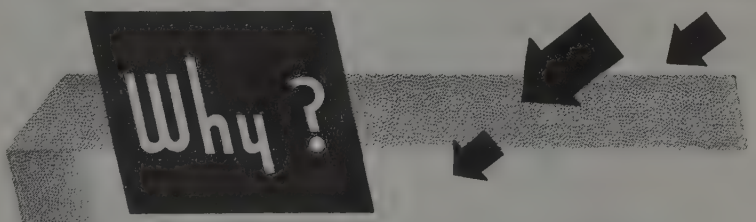
Boston—An improvement in supply of cold-rolled sheets is expected ahead of hot-rolled and there are signs for this development in third quarter. Actually, unexpected offerings of tonnage for this quarter have been made by producers who have curtailed hot carbon distribution in this territory. Mills in some instances are making progress against special grade backlogs and improvement in electrical sheets may be an eventuality before what was considered probable recently. Slight hope for this is held for galvanized. Buying of narrow cold strip is more orderly, if not actually slowing down, as fabricators of finished strip products note a slackening in demand coupled with inventory considerations which prompt a realignment of estimates. Absence of uniformity in prices confuses consumers. While the new range in carbon classifications is more general on the Worcester base, considerable tonnage is involved in sales on flexible basing points in the East on which the new carbon split is not being applied, notably on 0.80 carbon and over. There are differences in edge and finish extras with several basing points affecting prices, including New York, Jersey City, Trenton and others. Alloy strip, including stainless is easy, mills seeking volume for May delivery.

Philadelphia — Sheet consumers are pressing for tonnage, where the mills are behind on deliveries due them, but are less urgent in their requests for new tonnage since they appreciate the sold-up condition of most sellers. They could consume much more than they are receiving.

Cincinnati—Sheet mills in the district are operating at practical capacity as the sales departments continue under heavy pressure from consumers. Although books show heavy tonnages for housing, mill interests examine closely such inquiries to avoid abuses. Ending of housing priorities will leave little or no more sheet tonnage for many fabricators of long standing in view of diversions to the freight car program. Steelmaking is holding near practical capacity, with only a small portion of output earmarked for needs other than sheets.

Birmingham — Sheet mills continue a losing fight against the most insistent demand the district has ever known. Manufacturers have pressed mills for shipments for several months and now seasonal demand for roofing and miscellaneous sheets will add to the general

Speaking of HEAT EXCHANGERS
You'll find ROSS first in so many uses



It's well known that over 81% of the Diesel engine builders use Ross lube oil and jacket water coolors . . . that an overwhelming percentage of hydraulic press builders use Ross oil coolers . . . that the U. S. Navy is a mammoth consumer of Ross oil and water coolers and heaters . . . and on and on it goes in the chemical, food, petroleum, machinery, paper mill and other fields!

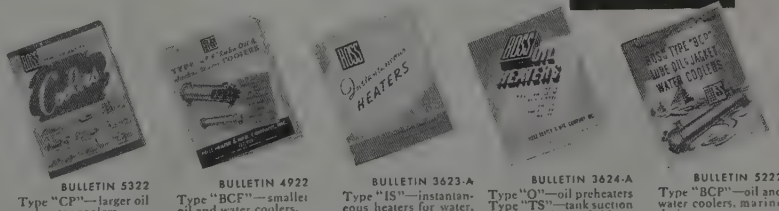
But, why? First of all, industries like standardized lines. They mean mass production—faster, more economical output. Ross is a leader in standardization of coolers, heaters, heat exchangers, condensers. Secondly, industries like the possibility of tailor-made features in Ross standard equipment—individually assembling STANDARD parts to meet individual requirements. They mean meeting your operating conditions and performance needs *exactly* without paying a premium for specially engineered units.

Just as soon as your next heat exchange problem comes up, call in a Ross engineer. He'll show you how Ross standardized lines can be tailored to your needs.

In the meantime, send a request on your company letterhead for whatever Ross bulletins you'd like for your files.

Ross Heater & Mfg. Co., Inc., Division of American Radiator & Standard Sanitary Corp., 1431 West Ave., Buffalo 13, N. Y. In Canada: Horton Steel Works, Ltd., Fort Erie, Ontario.

ROSS



BULLETIN 5322
Type "CP"—larger oil and water coolers.

BULLETIN 4922
Type "BCF"—smaller oil and water coolers.

BULLETIN 3623-A
Type "IS"—instantaneous heaters for water, oils, chemicals.

BULLETIN 3624-A
Type "O"—oil preheaters
Type "TS"—tank suction heaters for heavy fluids.

BULLETIN 5222
Type "BCP"—oil and water coolers, marine design.

tightness. Some prospective sheet processors have looked the local situation over and moved on.

St. Louis — Sheet production here resumed after a two-day strike of roll-turners at Granite City Steel Co. There was no tonnage loss, since rolling operations were shifted to stock sizes. The strike, however, did set back orders two days on heavy gage hot sheets. Granite City plans reductions in extras amounting to about $1 per ton to conform to the recent Carnegie-Illinois action. Demand continues at top level, although shipments of 31,000 tons in March broke local peacetime records. Production approximated 85 per cent of capacity. However, shipments remain six to eight months behind shedule. Output of light sheets will drop by one-half the next two months when considerable equipment is moved to make way for a new cold finishing mill at Granite City Steel. The addition will raise rolling capacity to 300,000 tons annually and officials expect to catch up on present orders by August.

Refractories . . .

Refractories Prices, Page 166

New York—Sellers of fire clay, ladle and silica brick have advanced their prices $5 to $7 per thousand. An increase is expected to be announced here shortly on malleable bung brick. Changes became generally effective during the past week, with one leading producer making revisions Apr. 1.

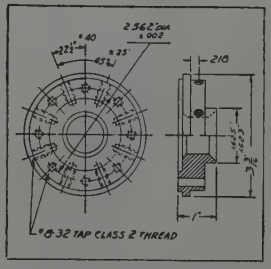
Precision Adapter for Drill Presses Perfects Alignment—Prevents Drift!

The new Aetna Adapter, of aluminum alloy, fits the columns of most small drill presses—assures accurate milling and accurate deep hole drilling—without a drill jig. It firmly and accurately holds interchangeable drill bushings close to work.

Precision alignment is accomplished through an eccentric aligning bushing, which once set needs no further adjustment. Filler bushings cover the entire bushing range up to ½". Stops to locate the piece to be drilled, are attached to the press table or directly to the adapter. Milling chatter is avoided. Chip interference is eliminated. Overlapping holes can be drilled without punch marks, or indication of run-out, with drills as small as 1/32" diameter. ¼" holes can be drilled more than 6" deep with as little as .006" drift.

Accuracy in work is achieved best by alert workers. That's why many plant owners make chewing gum available to all. The chewing action helps relieve monotony—helps keep workers alert, aiding them to do a better job with more ease and safety. And they can chew Wrigley's Spearmint Gum right on the job—even when hands are busy.

You can get complete information from Aetna Mfg. Co., 250 Chicago Ave., Oak Park, Ill.



Example of piece drilled with Aetna Adapter

AB-59

Producers Revise Extras On Cold-Finished Bars

Pittsburgh—Cold-finished carbon bar producers revised extra cards as of Apr. 1 to reflect recent revision in hot-rolled carbon bar extras. In general, adjustments involved revision in size, quantity, cutting and chemical requirements extras.

Producers have retained the 15 cent per hundred pound standard quality extra applicable to all sizes and analysis involving drawing, turning and grinding. Standard bar quality is now limited to sizes under 3-inch for rounds, squares, hexagons; other standard bar sizes under 39.1 pound per foot, when specified carbon is 0.28 per cent maximum and under.

For the high carbon steels when silicon is specified, there is a reduction on all sizes siliconwise of $1 per ton compared with the previous extra card. Formerly in high carbon steel the extra for silicon, including standard bar quality, was $5 per ton and there was an additional charge of $1 for carbon; now there is a $3 extra for standard bar quality plus a $2 carbon extra.

The size extras and range classifications for rounds have been revised downward $1 to $4 a ton. Formerly, there was an extra of 80 cents per 100 lb for size range 11/16 to less than 13/16 inch; 75 cents for 13/16 to less than 1½; and 70 cents for 1½ to less than 2½ inch. These size ranges with applicable extras have been revised as follows: 11/16 to less than 15/16 inch, 80 cents; 15/16 to less than 1 7/16; 1 7/16 to less than 1 15/16, 55 cents; and 1 15/16 to less than 2½ inch, 65 cents. A reduction in some size extras for squares also has been established. The size range 11/16 to less than 1½ inch has been cut 5 cents to $1.25 per 100 lb, and range 1½ inch to less than 2 1/16 inch reduced 10 cents to $1.30.

New width ranges in the size extra table for flats have been incorporated to remedy overlapping difficulties encountered in hot-rolled bar card; extras were not revised. The width range classifications now start with 6/16 to less than 9/16; formerly there was a width range less than 1/4 inch, and for 1/4 to less than 5/16 inch. There is now a separate size extra bracket for 6 inch width, and over 3 to less than 6 inches.

Cold finishers deviated from hot-rolled carbon bar extra revisions in that they did not revise treatment extras. Cutting to specified lengths extras for range 60 to less than 120 inches has been reduced $3 per ton and now are handled in same manner as length range 120 to less than 288 inches, if specific leeways in random lengths are permitted.

Quantity extras under one ton in lower brackets have been reduced about $5 per ton; no changes noted for over 2000 pounds. The quantity extra for less than 300 pounds is now $3.75; 300 to 499 pounds, $2.75; 500 to 999 pounds, $2; and 1000 to 1999 pounds, $1.25.

Steel Bars . . .

Bar Prices, Pages 164

Boston—Although allocations are generally unchanged for this quarter, bar inventories covering a wider range are more comfortable with some consumers. There are exceptions in the smaller car-

on sizes, but supply of cold-drawn stock own to one-half inch is easing. Evi-ence gathers that bars will be the first f the major carbon products to get into alance. Stocks of larger rounds and eavier flats in carbon grades are ample. Machinery and builders of miscellaneous quipment are better supplied for this uarter, but forge shops lack balance in arbon bar sizes.

New York—Shortage in small sizes of arbon bars continues pronounced and, hile there has been some easing recent-in medium sized bars as well as the rge sizes, demand is still well in excess supply. Alloy bars, however, are lentiful, with deliveries available in four six weeks. Producers generally have llowed the lead of the Carnegie-Illi-ois Steel Corp. in modifying extras.

Philadelphia — Pressure for small hot-olled carbon bars continues strong, not-ithstanding the easing in large sizes and, a limited degree, in the medium sizes. lost sellers look for little change in sup-ly of small bars before next quarter. he stringency in small cold-drawn car-on bars continues pronounced. Alloy ars can be had within a month to six eeks.

St. Louis — Merchant bar deliveries re reported improving, largely from out-de sources. Local production capacity filled six months ahead with scant pros-ect for improvement since no space on rawing schedules is in sight. Rounds nd flats under 1 inch are extremely arce. Demand from local warehouse nd railroad car manufacturers is in-nse.

Seattle—Order backlogs for merchant ars are still substantial. Demand con-nues strong with bookings about equal those of reinforcing bars. The pre-ar ratio was about 30 per cent for mer-hant bars and 70 per cent for reinforc-ng while the war ratio was exactly the verse. One mill is refusing new or-ers for flats, having a backlog to the nd of 1947. It is strictly a sellers' arket, mills giving preference to regu-ar customers.

Plates . . .

Plate Prices, Page 165

Philadelphia — Due primarily to re-isal of most producers to accept new ommitments, plate business is down sub-antially from three months ago. Sell-rs, operating on a quarterly quota basis, re booked up solidly for the current eriod and are not accepting business r shipment beyond, and those who ave been selling on an extended basis re booked so far ahead they don't care accept additional tonnage. Plate pro-ucers hope to bring their schedules ithin reasonable balance by late in the ird quarter. Some have been able to rtail arrearages rather appreciably, one astern independent entering the second uarter only two weeks behind current ommitments. Meanwhile, there is con-derable backing up of demand, with e overall stringency in plates still sec-nd only to that in sheets and strip. East-rn plate producers have been able to ep up their melting operations slightly uring the past week, reflecting a larger ovement of scrap, although the short-ge of pig iron likely will prevent them rom reaching capacity operations for ome time. One eastern mill, which has ng been asking special premiums, has dvanced prices on plates to 3.85c, bas-ing points, an increase of $9 a ton.

New York — Most plate producers have entered the second quarter with substantial arrearages. Some headway has been made since the beginning of last quarter, but this has been small in most cases, due to disruptions in gas supply and to the shortage in raw materials. As an easier situation in raw materials is anticipated, producers expect to make some progress during the current quarter toward bringing themselves abreast with current commitments. However, most sellers doubt if they will become fully current before late in the third quarter, if then.

Meanwhile, little new tonnage is being booked, as producers who are selling on a quarterly basis are booked up and are accepting no tonnage for shipment beyond and some who have been selling well into the future are refusing to take further orders. At least two eastern mills are covered for the remainder of the year at the present rate of operations, which now probably averages in each case at around 75 per cent of normal. Demand is still active, especially for the lighter gages, although in general not quite so brisk.

Boston—Delivery range on flanged work covers a wide period with larger spun heads the most extended, November for over 60-inch in some cases. Pressed heads are relatively easier, from May to June; latter is generally ahead of carbon plates and fabricators balance head and plate inventories with difficulty.

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Welding quality plates in small sizes are hard to get and tank shops are pressing for tonnage. One district distributor has curtailed its service station construction program. Weldment shops experience good demand. Floor plate volume exceeds postwar expectations in view of the decline in ship construction.

Birmingham — Plate production and demand continue active and at about the same level holding order backlogs steady. Inquiry is heavy for all types of plates, including floor, shipbuilding and tank. Deliveries on new business are far forward and indefinite.

Seattle — Plate demand continues strong while supplies are light. Some local plants are confining operations to small jobs, boilers and tanks.

Wire . . .

Wire Prices, Page 165

Pittsburgh—Tight supply situation in merchant and manufacturers' wire items is expected to show little, if any, improvement through remainder of this year. Some increase in overall wire output has been registered due to improved supply of gas for industrial applications resulting from milder weather. The Donora wire plant of American Steel & Wire Co. is back to about 90 per cent operating basis, same as for Jones & Laughlin Steel Corp. and other producers, but not, however, until considerable carryover tonnage had accumulated. This carryover tonnage further accentuates the critical supply problem for nearly all wire items, with possible exception of wire rope. Jobbers' inventories of merchant wire items have further receded lately, in some instances to dangerously low levels. Manufacturers' wire still is in tight supply although some deferments in shipments have been requested by lamp shade producers and others who report sharp falling off in demand.

Only price action in recent weeks was a $10 per ton increase in galvanizing extras for standard nails. The new galvanizing extra is $2.75 per 100 pounds for 15 gage and coarser; $3.25 for finer than 15 gage. Price revisions in extras for manufacturers' wire are expected to be announced by leading producer soon.

Boston—While some wire consumers are deferring shipments, others are pressing for additional tonnage. There is slight improvement in finished wire supply, but not rods to integrated mills or industrial users drawing their own wire. The outlook for semifinished is critical under current distribution policies and round wire for flattening is also scarce. Few holdups are emanating from the automotive industry and its suppliers, but in spots wire-drawing capacity is idle for the lack of rods. Nails furnish a paradoxical situation; with production currently around 800,000 tons annually, eastern distributors are not getting enough nails, they claim, and some have had allocations reduced. Midwest production is not coming east because of freight costs. An easy spot is razor blade steel. Blade manufacturers have large inventories and are not buying.

Chicago—Except for wire rope, demand for wire and wire products holds at peak levels, with manufacturers unable to accommodate customers in tonnage demanded. In merchant products, inquiries are heavy for barbed wire, fence posts, bale ties and the heavier gages of woven fence. In spite of this, co-operatives here are advertising fence and barbed wire in all styles and quantities at popular prices. Demand from furniture and bedding makers may ease soon, for they report retail outlets are finding high prices are restricting sales. Fabricators and other users are displaying some tendency to hold back on buying manufacturers' wire.

Birmingham — Wire products are being doled out by the handful as distributors and jobbers do their best to take care of at least some part of regular customers' demands. The mills continue their allocation program. Wire processors are short and nails and fencing are in inadequate supply.

Memphis, Tenn. — Copperweld Steel Co., Glassport, Pa., has been awarded contract for 2,500,000 side twists and 500,000 end twists, preformed noncorrosive wire, by the U. S. engineer, Memphis, inv. 81.

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Tin Plate . . .

Tin Plate Prices, Page 165

Pittsburgh — With extension until June 30 of tin controls officially decided tin plate producers are now in position to more reliably determine second quarter production schedules. Supply of tin plate through remainder of this year is expected to fall far short of indicated requirements. Demand for cans is well in excess of present company allocation

nd even should food pack requirements ail to measure up to projected volume he demand for general line cans would ore than take up the slack. Volume of lectrolytic tin plate specifications is run- ing increasingly heavier, with some ills reporting such business virtually atching that for hot-dipped tin plate. equirements for bonderized plate are latively light.

Chicago — Producers of tin plate are uite unable to meet the demands which stomers thrust upon them. Schedules re distressingly crowded, despite the igh level of operations maintained for any weeks. Finished material is mov- g out reasonably well, although the nsatisfactory car supply situation shows o sign of improving soon.

Tubular Goods . . .

Tubular Goods Prices, Page 165

Boston—Industrial users of tubing are r apart as to supply. Available from ock for antifriction bearing assembly seamless tubing, 52100 grade widely sed in that industry. Stainless is also eely offered from stock. At the other d of the line, carbon grades and pres- re tubing are sold well through the ear and lack of wanted grades still re- lts in some substituting of specifica- ons. This has crowded electric welded hedules which are also affected by mited supply of strip steel in some ses. Slight increase in galvanized pipe hipments is indicated this quarter; de- veries the first three months were down ue to production losses. Utilities seek place 1948 pipe requirements and nless something unforeseen develops me will be short of estimated require- ents for installation this year.

Philadelphia — Pressure pipe manu- acturers have been able to get more pig on allotted to them this month than as originally scheduled under the vol- ntary quotas established recently by roducers. They will not get as much s last month or as much as they want, ut last minute appeals to Washington esulted in some relief. As a result, me iron producers entered the month ith their schedules so upset they were ot able to advise their customers as to recisely how much tonnage they could rovide.

Pittsburgh — Mills are unable to ake any headway against expanding rder backlogs for standard line pipe nd oil country goods. Some interests ow booked into 1950. One of the items most pressing demand is exceptionally rge sized pipe available from only a latively few mills. Indicative of extent f the pent-up demand in relation to resent production facilities, a number f tubing manufacturers have received quiries to produce standard light weight ipe on tube mills, with customers will- g to pay premiums up to $50 a ton.

Some tubing producers now are in osition to make more reasonable deliv- ry promises, and most manufacturers ontend that a buyer's market is not o far off.

Unbalanced distribution of pig iron in ecent months has further retarded out- ut of high pressure cast iron pipe. Lead- g producer reports 15 to 18 months' rder backlog despite fact much new unicipal and other type projects have een temporarily shelved due to ex- ended deliveries with consequent uncer- ain cost factors.

Seattle — Cast iron pipe agencies are handicapped by short supplies and long deliveries in this district. Although contracts are now based on 1948 delivery, demand continues strong.

Bolts, Nuts . . .

Bolt, Nut, Rivet Prices, Page 165

New York — Bolt and nut makers are making little, if any, headway on their order backlogs, which average around six months. Particular stringency is in sizes ½ by 6 inches and smaller, required for various manufacturing assemblies. On the other hand, structural items are in fairly easy supply, despite substantial demand from abroad.

While some easing is noted in medium sized bars, bolt and nut makers assert it has not helped them materially and that the situation in the small sizes of bars and wire rods is as tight as ever. The stringency prevails in bessemer as well as in open-hearth steel.

Ferroalloys . . .

Ferroalloy Prices, Page 167

Pittsburgh — Carnegie-Illinois Steel Corp advanced spiegeleisen prices $4 per gross ton in carlots, effective on shipments Apr. 1. The new price is $48 per ton at Pittsburgh for 19-21 per cent manganese and $47 for 16 to under 19 per cent manganese.

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Structural Shapes . . .

Inquiry declines as high construction costs delay many projects

Structural Shape Prices, Page 165

New York — Structural steel demand is tapering, due primarily to construction costs. Various projects have been drawn up, but are being held inactive pending either a readjustment of costs or greater assurance there will be no readjustment. Most contractors, while admitting they cannot expect prewar prices, believe there will be some downward revision in costs over coming months. Only such jobs as are more or less urgent and can still promise a satisfactory return, notwithstanding present prices, are going ahead.

A secondary factor in the present decline is continued difficulty in getting materials and components.

Some of the most urgent work includes veterans hospitals, with plans for a large project in South Orange issued during the past week for bidding. This project will require 6500 to 7000 tons. Another such project for Manhattan is in a formative stage, with specifications likely to be brought out in three or four months.

The United Nations headquarters development on the east side of Manhattan, requiring in all an estimated 100,000 tons, will start becoming active within the next two or three months. It is believed that the first unit, requiring approximately 15,000 tons, will be up for figures not later than July 1.

Philadelphia — Structural steel buying is spotty, pending primarily a stabilization of building costs and improved delivery prospects of desired steel and manufactured components. There is some delay also in nonhousing construction due to lack of government approval. That situation is easing, however, as indicated by government approval in this district of 41 projects, valued at $2,063,619 against rejection of 13 projects valued at $246,400.

Boston—Confronted with less tonnage this quarter, structural fabricators are operating on a narrow margin of plain material to meet commitments; in the case of district shops, bulk of contracts call for nearby delivery of fabricated material. Warehouse stocks are low and rounding out tonnage for fill-in needs is increasingly difficult. Several structural mills are eliminating at least one month's tonnage this quarter in efforts to catch up on delinquent volume. Bridge inquiry is slightly heavier, but under normal for this period, around 1700 tons.

Pittsburgh — An estimated $15 million worth of steel alone is expected to be needed for Pittsburgh Consolidation Coal Co.'s proposed conversion coal-gas plant here. Orders already have been placed for much of the material and equipment to be used in setting up the company's $300,000 pilot plant. Construction programs recently approved by OTC, include $459,380 extension from Somerset, Pa., state hospital and a number of new school projects. Johnson Bronze Co. plans to begin expansion of its plant at New Castle, Pa., this month at estimated cost of $1 million for construction and machinery. The Pittsburgh-DuBois Co., manufacturer of gas meters, soon is scheduled to open its fourth Pennsylvania plant. To obtain 8000 square feet of additional factory space in a hurry, the Susquehanna Wire Rope Co., Sunbury, Pa., is erecting a prefabricated metal quonset hut. Prospect is bright for continued high level of construction activity, although extended mill deliveries and fact fabricators are not in position to take on additional work, because they are so far behind schedule on most of the jobs already booked, probably will continue to be major retarding factors.

Cleveland — State projects requiring large tonnages of structurals and reinforcing bars will be placed under contract in the second quarter. Contracts for four Newburgh & South Shore Railroad bridges in this city will be let Apr. 22 as part of a $5 million freeway development. Other contracts covering road and cloverleaf construction will be let May 20 and June 6. According to unconfirmed reports, the New York Central plans to build a large office building here which would cost between $12 million and $15 million at present construction costs. Method of financing the project as well as the probability of finding a contractor willing to make a "firm" bid is being studied, it is said.

Seattle — Steel fabricating plants are seriously hampered by reduced mill allocations and inventories are far below requirements. No improvement is expected until third quarter. Meanwhile, it is impossible to bid on many sizable jobs and new business is confined to smaller tonnages.

Tool Steels . . .

Tool Steel Prices, Page 165

Cleveland — New base prices and extras on tool steels announced early in the year, went into effect Apr. 1. The changes result in an average increase of about 10 per cent over the prewar prices. Buyers bought heavily in the first quarter in an attempt to build up stocks of standard items before the price advance become effective and, as a result, delivery schedules were extended. Supplies are now ample with deliveries available within six weeks on standard products and by late May or June on products requiring special heats and sizes. Foreign competition which was an important market factor in prewar years, is light due in part to operating difficulties which have been encountered by producers in England and Sweden. Improvements which were made during the war in domestic tool steels have placed the domestic industry on a strong competitive basis.

Stainless Steel . . .

Cleveland—Stainless steel products are being offered freely in this district with deliveries of most items being promised within a month. The allotment plan under which customers had been receiving restricted tonnages, based on purchases in a base period, has been discarded by at least one large seller and will be discarded by others by June. Easiness in supplies developed when consumers began reducing their orders on mills' books and ordering deferments on shipments in order to reduce inventories of these relatively high-priced items. Practically all users of stainless steel, including the automotive industry, have adopted a conservative stock policy so far as stainless is concerned. Expansion of the industry's stainless steel capacity also accounts for easiness in supplies.

Reinforcing Bars . . .

Demand continues heavy especially for smaller jobs, including highway work

Reinforcing Bar Prices, Page 164

Chicago — Reinforcing steel suppliers report increased inquiries for small tonnages, and for the most part they are concentrating activity on these. Shortage of steel is restricting activity in the bigger jobs which use up mill allotments of steel rapidly. Already there is a feeling developing that the time is rapidly approaching when steel supply and demand come into balance, a time which may arrive quicker than most suspect. Of new inquiry coming out week by week, an increasing proportion is for highway construction.

Pittsburgh — Reinforcing bar shipments from mills remain under strict allocation, with distribution pattern governed to a large extent by amount of freight absorption involved. Some producers, for example, are not meeting the Detroit price arbitraries on concrete bars; in other instances, mills are no longer shipping to fabricators in East coast areas.

New inquiries continue heavy and beyond ability of the industry to satisfy. Ratio of concrete to merchant bar output has held relatively unchanged during the past six months, in contrast to previous trend of increasing merchant bar output at expense of concrete bars. There are some indications of a slight shift to increasing production of concrete bars in third or fourth quarter. The distorted price relationship between merchant and concrete bars has been remedied, and there has been some softening recently in demand for larger merchant carbon rounds, which factors should make possible increased output of concrete bars later this year as openings in merchant bar mill production schedules develop.

Seattle — Demand for reinforcing bars is increasing, leading mills reporting heavy order backlogs. Bureau of Reclamation officials report that about 22,000 tons of reinforcing bars are being used on contracts already awarded in the Columbia river basin, only a fraction of the approximately 110,000 tons that will be required in completing the irrigation system. About 57,000 tons were used in building Grand Coulee dam.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 166

Cleveland — Coking coal stocks for production of by-product foundry coke here are adequate to weather the coal mining stoppage, if resumption of mining holds to schedule. If the stoppage should last longer than the announced six days, however, by next week output of the ovens would be curtailed to conserve the remaining coal stocks.

Cincinnati — Babcock Coal & Coke Co. advanced its price for beehive foundry coke 75 cents a ton, effective Apr. 1, to $12.50, ovens. This marks the first advance by the company this year.

Scrap . . .

Market slumps in many districts as mills cancel high-priced orders

Scrap Prices, Page 170

Pittsburgh — Temporary withdrawal om the scrap market by virtually all eel producers here represents the third ncerted effort in recent months to em the upward price spiral. Prospect f success in this latest effort to halt he advance is considered much better t this time. In the absence of any orders r steelmaking grades, prices at the oment are temporarily nominal.

Scrap shipments (notably from cusmers in remote areas) increased subantially the past few weeks, placing mills a more favorable inventory position an was the case at the time of the other revious attempts to halt the upward rice movement. Intensified scrap colction efforts and consequent further nprovement in flow of material to onsumers' yards is expected over the ext 60 days. This brighter supply utlook is based on more open weather, ermitting greater collection and segreation activity; also, there is a growing elief among dealers and brokers that psurge in prices has run its course which hould result in available material movng quickly into consumer channels.

There was no indication up until late ast week as to what price level mills ill place new commitments when they e-enter the market. Extent of the posible downward price adjustment would e dependent to some extent on the price rend in remote points for dealer scrap. ince this area produces only about 40 er cent of its normal scrap requirements, o significant reduction in prices for naterial originating here is indicated ntil some of the geographical price disocations have been readjusted to bring elivered prices further in line with local crap prices. Since mills here are reeiving such a large volume of their remote scrap requirements from customers n negotiated price deals (well below stablished market in most instances), teel producers could establish a local crap price here that need not be tied o prices at remote points.

A price cut of $3 to $5 a ton for local crap is considered possible by some ealers and brokers when mills re-enter he market. However, continued record eacetime steel production pace plus fact hat supply, while improved, is not yet lentiful, are important factors working gainst any sharp downward price trend n immediate future. Mills have been sing a high ratio of pig iron to scrap (75 to 25 in some instances) in openhearth operations the past few months to help alleviate the scrap shortage. Daily pig iron loss of 5000 tons last week at leading producer's plants here, resulting from the shutdown of soft coal mines meant that scrap charge had to be increased to maintain practical ingot operating pace.

Cast scrap prices remained unchanged last week, with supply continuing well below stated requirements. Inadequate pig iron supply further accentuates the cast scrap shortage.

Philadelphia—Steelmaking scrap prices continue to weaken, with the market now around $36 delivered on No. 1 and No. 2 heavy melting, busheling and No.

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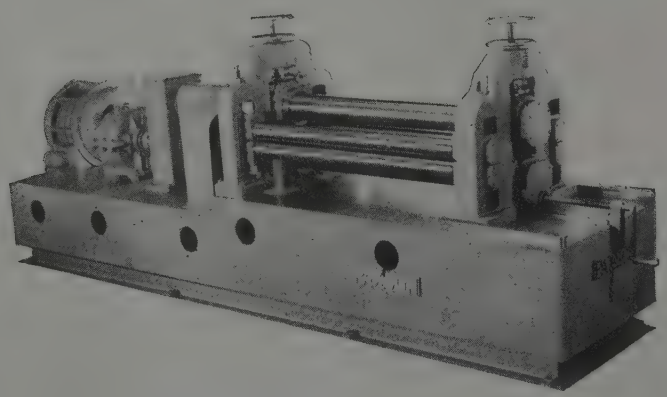

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1 and No. 2 bundles, and $34 on No. 3 bundles. Turnings also have eased further with machine shop at $26-27 and mixed borings and turnings at $23-24 delivered. Short shoveling turnings are $27.50. Low phos grades are down, with bar crops and plate, and punchings and plate scrap and cut structurals at $40-41, electric furnace at $37 and heavy turnings at $38-39. All cast grades are unchanged, except heavy breakable, which is off slightly to $46.50-47, and No. 1 wheels which are down to $47-49.

Some leading consumers of melting steel continue out of the market, operating on shipments against old contracts, while others are buying on a day-to-day basis, pending further settlement of the market. One district mill, and this had not happened for a long time, suspended shipments for several days because of congestion of cars.

Further, consumers are becoming much more discriminating in their acceptance of tonnage, various rejections having been noted recently and especially in bundled scrap. Some of this latter material has contained tar and other combustible material which has menaced life and property and in other respects has been clearly of inferior quality.

A Pennsylvania railroad scrap list for April, closing the 9th, involves 20,230 tons, including 4000 tons, destroyed steel cars; 2050 tons, No. 1 steel rails; 2000 tons, No. 1 heavy melting steel; 1450 tons, No. 3 rail steel.

Boston—Consumer pressure for the re-establishment of normal price differentials on steel scrap grades accompanies reaction in the main price structure. Machine shop and short shoveling turnings are down with heavy melting steel with buying light; prices are not stabilized at the lower ranges and general consumer opinion is that steel scrap is still too high in relation to pig iron. Admittedly a substantial tonnage of available scrap moved at the $36 market and the supply situation on the downward movement is tight. Cast grades are not reacting to the decline in steel scrap; prices are firm and reflect the short supply and lack of reserves among consumers.

New York — With most leading scrap consumers marking time pending further price developments, brokers' buying offerings have again declined. These interests are now offering $32.25-32.75 fob shipping point, on No. 1 and No. 2 heavy melting steel, busheling and No. 1 and No. 2 bundles, and $30.25-30.75 on No. 3 bundles. The market on turnings has rebounded slightly, with machine shop material and mixed borings and turnings holding at $20.50-$21 and short shovel turnings at $24.50-25. Punchings and plate scrap and cut structurals are unchanged at $35-35.50, although an adjustment has been made in electric furnace bundles which brings the market up to around $33.25-33.75. Cupola cast and unstripped motor blocks are easier at $41.50-42, and charging box cast at $40.50-41.

Buffalo—Weakness swept through the scrap market last week as mills canceled orders placed at recently-boomed prices. While fresh sales and firm bids were awaited to establish actual ranges, prices were quoted $5 to $7 a ton lower on a nominal basis. Confusion dominates the market as price guides are sought. One top buyer announced that it considered heavy melting scrap and bundles worth no more than $37.25 a ton, which compares with a recent range of $40 to $41.

First indication of the price break came when outside buying interests withdrew from this area as one of the leading mill consumers raised bids to the $40 to $41 range. Order cancellations than followed as area buyers were again in command of the market. Demand for cast items continues strong, but these grades were included in the price adjustment.

Cleveland — A weaker price tone developed in the scrap market here last week with heavy melting grades quoted $2 lower at $35 to $35.50. Mills withdrew from the market and canceled all contracts as they expired, refusing to accept any over-shipments. Another manifestation of easiness in the market was insistence of the mills on strict grading. All interests were hesitant on bidding for material. Foundry grades continued firm.

Cincinnati—Softening of scrap prices recently has encouraged spreading of resistance to the high price level. Tonnages are not being seized as eagerly as in previous weeks, although cast grades appeared fairly steady at nominally unchanged prices. Heavy melting steel dropped $1 in adjustment to this situation.

Chicago — Heavy melting scrap now is quoted at $33 a ton, a decline of $3 from a week ago. Although this is the top price mills have announced they will pay, little new tonnage has been contracted for. Some consumers are out of the market for the moment. Receipts of scrap are heavy as contracts made at the old price are being consummated. Because of the weaker market trend, mills are interested only in short-term commitments of 30-days or less. Numerous grades of scrap are untested since the market broke and quotations are nominal.

Birmingham — Scrap is relatively easier here with some new tonnage putting in an appearance, largely under the stimulus of high prices and off-side premiums. Not a great deal of stability, however, is evident in the market, and none is in prospect until the general iron and steel picture clears.

Pig Iron . . .

Pig Iron Prices, Page 166

Pittsburgh — Carnegie-Illinois Steel Corp. was forced to curtail pig iron output by about 500 tons daily throughout the past week due to complete shutdown of its coal mines for the miners' memorial period. Blast furnace operations were held unchanged by other interests, however, because of their better coal supply in relation to daily requirements. At the close of last week an equivalent of 37 out of 47 blast furnaces were pouring iron in this district, or 6 below preceding week. Despite this reduction in iron output, steel ingot production was unaffected at practical capacity pace, with operators able to offset the iron deficiency through increasing scrap charge.

New York—A slight betterment in the district foundry melt is anticipated this month, primarily because of an easing in scrap supply, which might reduce the pressure a little on pig iron. The easing in scrap might be reflected in some measure in the cast grades, although cast grades are still scarce. Benefit accruing to the foundries as a result of an easing in the scrap supply in general would be felt more by way of better pig iron shipments.

March pig iron production is expected to recover much of ground lost in February. April may show little change, despite the fact that pig iron production was at least slightly affected by suspension of operations in the coal mines.

Before spring is over, pig iron production may reach an all-time high, exceeding the March, 1944, record of 5,370,670 tons.

Boston — New England pig iron consumers are due for a stiff increase in pig iron costs. When the $12 a ton premium subsidy expires at the end of this quarter, the Everett furnace expects to continue operation and at a higher price than the subsidy provides now. A higher price than the subsidy now provides would mean better than $41.50, Everett, for No. 2 foundry.

Philadelphia — Shipment of Texas iron into the north appears further removed than had been indicated a week ago. Some observers doubt if much will be available before the end of the third quarter. Revision in estimates as to the cost of Daingerfield, Tex., iron delivered in this district now place the figure at around $67.25.

St. Louis — Pig iron supplies remain extremely tight and will become even scarcer. One of Koppers Co. Inc.'s two local furnaces is to be shut down three weeks for repairs, costing the district around 500 tons daily.

Warehouse . . .

Warehouse Prices, Page 167

Cleveland — Jobbers here expect no easing this quarter of pressure for hot-rolled products. The sporadic deliveries of sheets and strip leave the warehouse floors immediately. Easier flow of large sized carbon bars and of drill rods is evidenced, but small size bars are still acutely short. Shapes and plates show no improvement, which is to be expected in view of the expanded freight car building program. Receipts of welded tubing are spotty and inventories lack balance. Mills are attempting to catch up on first quarter carryovers and to do this will ship only part of the current quarter's quotas.

Warehouse stock price books, almost ready for distribution when extras were revised recently, are again being figured, but when their release will come is not known.

New York—Warehouse stocks are still unbalanced. Alloys, including stainless, tool steel and larger bars are plentiful; flat-rolled, plates, structurals, small carbon rounds and wire products are in short supply. No improvement in the latter critical items is expected this quarter. While demand for warehouse steel holds at a high level, buying is somewhat more conservative with more consumers on an inventory-budget basis. Cold-finished bar supply is improving in a lower range of sizes and are in better balance down to ½-inch. Slight revisions in prices are being made in line with mill extra changes.

Cincinnati—Urgent demands for steel from warehouse are coming from the coal mining industry. The tonnage needs were considered normal, but against inadequate supplies. Jobbers are also pressed to meet requirements on smaller building projects. Inventory position is unimproved, the pinch being especially severe in flat-rolled, small rounds, and structural steel.

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Rails, Cars . . .

Track Material Prices, Page 165

Cleveland—Supply of multiple-wear car wheels has increased substantially in recent weeks and leading sellers are now offering from late June to August delivery. In one-wear wheels, fourth quarter delivery is the best obtainable and some sellers are virtually out of the market. Tightness in the latter type wheels is expected to increase as soon as other components required under the freight car program become more readily available and production is stepped up.

Canada . . .

Toronto, Ont. — Production of iron and steel in Canada during January showed a substantial gain over most months of 1946. Pig iron output made an all-time record at 177,313 net tons, or 76.7 per cent of total rated capacity and compares with 161,464 tons in December when the rate was 69.9 per cent, and with 143,685 tons in January, 1946.

Output of ferroalloys in January amounted to 9644 net tons, compared with 11,766 tons in December and 10,878 tons in January, 1946. Ferroalloys produced included ferrosilicon, silicomanganese ferromanganese, ferrochrome, chorm-x and ferrophosphorus.

For January, production of steel ingots and castings totaled 249,798 net tons, compared with 237,300 tons in December and 244,623 tons in January, 1946. Output for the month included 243,557 tons of steel ingots and 6241 tons of steel for castings.

West Coast Price Bases Named on Sheets, Shapes

Additional West Coast base prices were announced last week by Columbia Steel Co., U. S. Steel subsidiary, at Los Angeles and San Francisco. The new base prices, effective Apr. 1, are for hot-rolled sheets, galvanized, culvert and well casing sheets, and shapes within range of sizes and grades produced. This price move closely follows similar action taken earlier this year on merchant and concrete bars, manufacturers and merchant quality wire items and wire rods.

The newly established West Coast base prices are $10 to $12 per ton above comparative eastern base price levels, reflecting in part increased production costs. However, when ocean freight and handling charges from nearest eastern base to West Coast are taken into account, the new Pacific Coast base prices range up to about $5 per ton below delivered prices from the East Coast. Compared with the old West Coast arbitraries the present base delivered prices at Los Angeles and San Francisco are up about $4 per ton.

Details of latest price action by Columbia Steel Co., covering only grades and sizes produced, follow: For hot-rolled sheets 18 gage and heavier produced at Torrance and Pittsburg, Calif., the new base delivered price at Los Angeles is $3.24 per 100 pounds and $3.245 at San Francisco; hot-rolled annealed, 19 gage and lighter, $4.27 at Los Angeles and $4.275 San Francisco; galvanized sheets, $4.32 Los Angeles and $4.945 San Francisco; well casing sheets, produced at Torrance, $3.99 Los Angeles; structural shapes, also produced at Torrance only, $3.17 Los Angeles.

U. S. Steel Says Steel Price Action Depends on Wages

(*Concluded from Page* 64)

several cents per pound from the 12 to 15 cents per pound recently quoted.

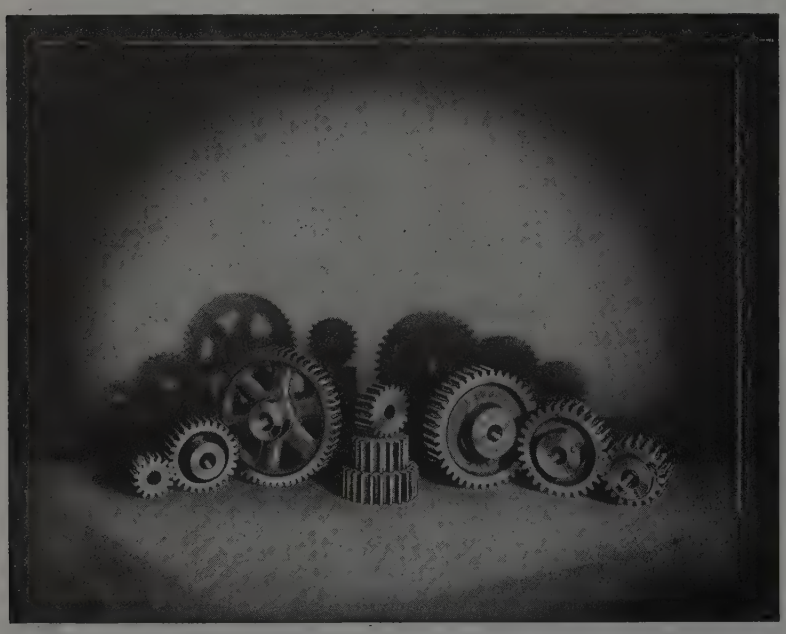
In connection with "gray" market operations, recent reports that the Federal Trade Commission is investigating the situation were confirmed last week. However, it appears the investigation is but part of a general study of distribution and marketing policies of the large corporations which has been under way since 1946.

In a letter to Tom L. Smith, executive vice president, Pressed Metal Institute, Cleveland, William H. England, director, FTC Division of Accounts, Statistics & Economic Investigations, asked Mr. Smith to provide the commission with information on the various practices in current steel distribution which are alleged to be hampering the stamping industry.

In its study of the steel industry the commission is seeking information on specific activities with respect to steel company competition with non-integrated fabricators, and changes in mill practices which diverge materially from the prewar pattern of supply.

Mr. Smith has relayed the commission's letter to about 1000 stamping manufacturers suggesting that they, if they wish, furnish the FTC with any information they think pertinent.

Steel producers deny their distribution policies work to the disadvantage of any class of consumer. Since the end of the war, output has been allocated to consumers on the basis of prewar consuming demand. Some departure from the prewar distribution pattern, of course, has taken place but in the main data show the various consuming lines have received steel in about the same proportion they did prewar. In the case of the warehouses, which serve thousands of small consumers, including new enterprises launched by veterans, they have been receiving somewhat larger tonnage, percentagewise, than prewar. For example, distribution data for the first 11 months of 1946 show that the warehouses received 34 per cent of cold-finished bar production compared with only 20 per cent prewar.



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STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

3500 tons, transmission towers, Indiana and Michigan Electric Co., to American Bridge Co., Pittsburgh.

3500 tons, buildings, National Biscuit Co., Houston, Tex., to the Mosher Steel Co., that city.

3316 tons, H-piles, U. S. engineer, New York, inv. 74; Carnegie-Illinois Steel Corp., Pittsburgh, awarded 1653 tons, 59-foot and under sections; Bethlehem Steel Co., Bethlehem, Pa. awarded 1663 tons, 59.5-foot and over sections.

1650 tons, buildings, Sloan, Blabon Co., Trenton, N. J., through Walter Kidde & Co., New York, to American Bridge Co., Pittsburgh.

1290 tons, grease plant, Pure Oil Co., Smith Bluff, Tex., to Mosher Steel Co., Houston, Tex.

1100 tons, Franklin Delano Roosevelt hospital, Peekskill, N. Y., to Park Iron Works, a northern New Jersey fabricator, through Merrett, Chapman & Scott Corp., New York.

1000 tons, department store, R. H. Macy Co., White Plains, N. Y., to Harris Structural Steel Co., New York.

870 tons, gas generating plant extension, Consolidated Edison Co., New York, to American Bridge Co., Pittsburgh.

800 tons, miscellaneous work, Sinclair Oil Co., New York, mostly construction around East Chicago, Ind., to American Bridge Co., Pittsburgh.

750 tons additional, Weyeraeuser Timber Co. plants, Longview, Wash., to Isaacson Iron Works, Seattle.

600 tons, addition to power plant, Oklahoma Gas & Electric Co., White Eagle, Okla., to Kansas City Structural Steel Co., Kansas City, Kans.

500 tons, factory building, Congoleum-Nairn Inc., Marcus Hook, Pa., to Belmont Iron Works, Eddystone, Pa.

430 tons, factory, Commercial Decal Inc., Mt. Vernon, N. Y., to Harris Structural Steel Co., New York.

370 tons, alterations, Saks 34th St. store, New York, to Dreier Iron Works, New York.

315 tons, building at Philadelphia for the Sloan, Blabon Co., Trenton, N. J., through Walter Kidde & Co., New York, to Lehigh Structural Steel Co., Allentown, Pa.

285 tons, substation, Consolidated Edison Co., New York, at Jamaica, Long Island, to Lehigh Structural Steel Co., Allentown, Pa.

230 tons, State Bridge, Cumberland county, Pennsylvania, to Bethlehem Steel Co., Bethlehem, Pa.

190 tons, Dollar Savings Bank, Bronx, N. Y., to Schacht Steel Construction Inc., New York.

155 tons, alterations, Squibb & Son, Long Island City, N. Y., through John W. Harris, to Drier Iron Works, New York.

128 tons, bridge, Marinette county, Wis., for State Highway Commission, to Worden-Allen Co., Milwaukee; bids, Mar. 25.

125 tons, University of Washington building, Seattle, to Isaacson Iron Works, Seattle.

105 tons, power stations, Maine Public Service Co., Caribou, Me., to Phoenix Bridge Co., Phoenixville, Pa.

100 tons additional, Crown-Zellerbach Co. plant, Casmas, Wash., to Pacific Car & Foundry Co., Seattle.

100 tons, apple packing plant, Hancock, Md., to Bethlehem Steel Co., Bethlehem, Pa.

STRUCTURAL STEEL PENDING

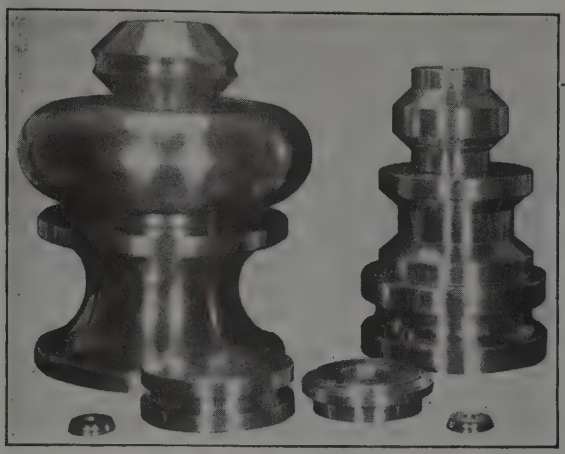
36.000 tons, sheet piling, Long Beach, Calif., for city; bids Mar. 26.

2200 tons, truck terminal, Port of New York Authority, New York, bids Apr. 8.

1800 tons, buildings, United States Gypsum Co., Altovista, Va.

700 tons, Sterling Laboratory, Rensselaer, N. Y., bids closed; plans originally called for 1000 but were later revised.

700 tons, highway bridge, Crandall, Tex., for State Highway Department.



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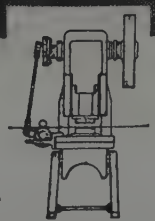

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700 tons, 12-story building, Greenwich Savings Bank, West 57th St., New York, bids asked.

630 tons, building, A. B. R. store, Broad street, Newark, N. J., M. Shapiro Sons., New York, bids closed Apr. 1.

550 tons, Cardinal Stepinac school, White Plains, N. Y., bids asked through George A. Fuller & Co., New York.

525 tons, dormitory, Masachusetts Institute of Technology, Cambridge, Mass.

485 tons, Methodist Home, Ocean Grove, N. J., pending.

425 tons, print works building, Cranston, R. I.; Lockwood-Green Co., engineers.

335 tons, addition, Adam Scheidt brewery, Norristown, Pa., pending.

300 tons, cancer research laboratory, Philadelphia, bids asked.

300 tons, building, Stevens Institute of Technology, Hoboken, N. J., pending.

220 tons, beam spans, Project. F 028-4(14), Douglas county, Wis., for State Highway Commission; bids Apr. 8.

196 tons, beam spans, Proj. S 075(3), Dunn county, Wis., for State Highway Commission; bids Apr. 8.

196 tons, beam spans, Projs. F 019-2(7) and F 04-4(11), Wood county, Wis., for State Highway Commission; bids Apr. 8.

100 tons, shapes and bars, one-span I-beam bridge, Brattleboro, Vt.; bids Apr. 10.

173 tons, beam spans, Projs. 0137(2) and T 0203(2), Grant county, Wis., for State Highway Commission; bids Apr. 8.

172 tons, Fish creek bridge, Proj. WER 1, Bayfield county, Wis., for State Highway Commission; bids Apr. 8.

160 tons, Sacred Heart School, Newburgh, N. Y., specifications revised.

150 tons, factory building, Milwaukee Envelope Co., Milwaukee.

139 tons, beam spans, Proj. T 024-1(1), Vilas county, Wis., for State Highway Commission; bids Apr. 8.

110 tons, sheet piling, Standard Oil Co. of Indiana, Whiting, Ind.; Lummus Co., Chicago, contractor.

110 tons, factory, Cherry River Paper Co., Bensenville, Ill.

100 tons, Washington state bridge, Wahkiakum county; bids to Olympia, Apr. 15.

Unstated tonnage, East New York Bus Terminal, Board of Transportation, Brooklyn, bids closed Apr. 5.

Unstated, three railroad and two highway plate girder and truss bridges over Puyallup river, Tacoma, Wash.; bids soon to U. S. engineer, Seattle.

Unstated, 125-ton overhead traveling crane; bids to Bonneville Administration, Portland, Oreg., Apr. 18.

REINFORCING BARS . . .

REINFORCING BARS PLACED

400 tons, University of Washington building, Seattle, to Bethlehem Pacific Coast Steel Co.

365 tons, including 145 tons bars and 220 tons bar joists, Sisters of the Good Shepherd, Cleveland, to Bethlehem Steel Co., Bethlehem, Pa.; Walter Butler Co., St. Paul, contractor.

850 tons, Washington State College buildings, Pullman, Wash., to Bethlehem Pacific Coast Steel Co., Seattle.

204 tons, mechanical engineering building, University of Illinois, Urbana, Ill., to Joseph T. Ryerson & Son Inc., Chicago; James McHugh Construction Co., Chicago, contractor; bids Feb. 27.

REINFORCING BARS PENDING

1000 tons, Hippodrome building, St. Paul; bids Mar. 19, none received.

300 tons, Teachers College, St. Cloud, Minn.; general contract to Hagstrom Construction Co., St. Paul; bids Mar. 18.

125 tons, service building, State Hospital, Carbondale, Ill.; bids Apr 1.

110 tons, water reservoir, Prairie du Chien, Wis.; bids over estimate, rejected.

100 tons or more, Washington state highway projects; bids to Olympia Apr. 15.

Unstated, navigation lock, approaches, etc., McNary dam, Columbia river; general contract by U. S. Engineer, Portland, Oreg., to G. F. Atkinson Co., San Francisco, low $743,485.

Unstated, Dorena dam, Lane county, Oregon, involving spillway, etc.; general contract to G. F. Atkinson Co., San Francisco, low $7,735,570, by U. S. Engineer, Portland, Oreg.

PLATES . . .

PLATES PLACED

500 tons, general boiler construction, to Birchfield Boiler Co., Tacoma, Wash.

400 tons, including shapes, for two fishing vessels, to Birchfield Boiler Co., Tacoma, Wash.

135 tons, standpipe, Brewer, Me., to Chicago Bridge & Iron Co., Chicago.

Unstated, 30 tanks, Weyerhaeuser Timber Co. sulphate plant, Longview, Wash., to Chicago Bridge & Iron Co., Chicago.

Unstated, pressure tanks for new plant, American Wood Treating Co., Everett, Wash., reported awarded to Chicago Bridge & Iron Co., Chicago.

Unstated, 23 steel tanks for Olympia Brewing Co., Olympia, Wash., to A. O. Smith Corp., Milwaukee.

PLATES PENDING

1400 tons, large diameter water pipe, Bow Lake project, Seattle; Valley Construction Co., Seattle, low, $376,760.

Unstated, 54,000 ft. of welded steel pipe, 16 to 36-inches, for irrigation project near Yakima, Wash., to American Pipe & Construction Co., Portland, Oreg.; Scheumann & Johnson, Seattle, contractors.

PIPE . . .

CAST IRON PIPE PLACED

1100 tons, 6 to 24-inch cast iron pipe, Seattle projects, to H. G. Purcell, Seattle, for U. S. Pipe & Foundry Co., Burlington, N. J.

CAST IRON PIPE PENDING

Unstated tonnage, 20,000 feet plus, 2 to 12-inch cast iron pipe, and accessories; bids to James O. Conville, city manager, Astoria, Oreg., Apr. 4.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Canadian Pacific, thirteen 1000-horsepower diesel-electric switch engines, to American Locomotive Co., New York.

Chicago, Indianapolis & Louisville, fifteen 1500 hp diesel-electric locomotives, 7 going to American Locomotive Co., New York, 6 to Electro-Motive Division, General Motors Corp., La Grange, Ill., and 2 to Fairbanks, Morse & Co., Chicago.

Southern Railroad, three 6000-horsepower freight Diesel-electric locomotives and four 1500-horsepower switch engines, to the Electro-Motive Division, General Motors Corp., La Grange, Ill.

RAILROAD CARS PLACED

Chicago Belt Line, 50 seventy-ton hopper cars, to General American Transportation Corp., Chicago.

Cudahy Packing Co., 150 forty-ton refrigerator cars, to its own shops.

Fruit Growers Express Co., 1000 forty-ton refrigerator cars, 500 going to the American Car & Foundry Co., New York, and 500 to its own shops at Indiana Harbor, Ind.

RAILROAD CARS PENDING

Bangor & Aroostook, 150 fifty-ton gondola cars, bids asked.

Canadian Pacific, 26 mail-baggage express cars, pending.

Chesapeake & Ohio, 3000 seventy-ton all-steel hopper cars, bids Apr. 17, on the basis of the builder's own specifications.

Missouri-Kansas-Texas, 500 seventy-ton hopper cars, bids asked.

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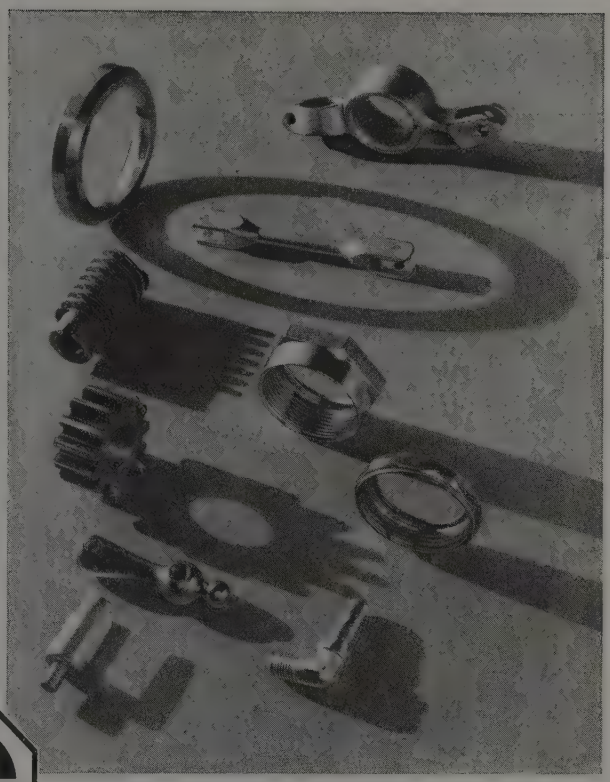
Jones & Lamson Machine Co., Springfield, Vermont
Timken-Detroit Axle Co., Detroit, Michigan



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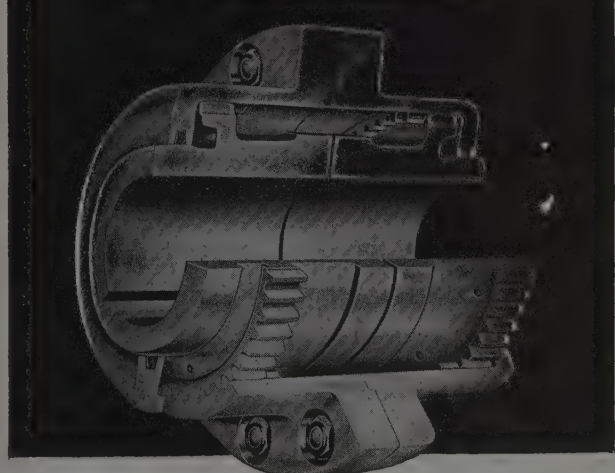

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ALABAMA

ENSLEY, ALA.—Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, will rebuild its lime manufacturing plant at a cost of $110,000.

ARKANSAS

EL DORADO, ARK.—Lion Oil Co. is spending $2,500,000 for additions to its chemical plant and refinery. These include an addition to the fertilizer plant, a nitric acid plant and a catalytic cracking unit for manufacture of gasoline.

LITTLE ROCK, ARK.—Westinghouse Electric Corp. will build a $4 million electric lamp plant here.

NORTH LITTLE ROCK, ARK.—Arkansas Power & Light Co., Pine Bluff, Ark., plans construction of power plant, to cost $4 million.

CONNECTICUT

BRIDGEPORT, CONN.—United Illuminating Co., 115 Broad St., plans construction of a 30,000 kw power station at an estimated cost of $1 million.

GEORGIA

ATLANTA—Firestone Tire & Rubber Co., 658 Whitehall St., has awarded a $300,000 contract to H. K. Ferguson Co., 18 Rector St., New York, for a warehouse and office.

ILLINOIS

CHICAGO—Electric Storage Battery Co., 4613 S. Western Ave., has awarded a $123,000 contract to Kaiser Ducet Co., 80 E. Jackson Blvd., for additions and remodeling of its plant.

CHICAGO—Triangle Package Machinery Co., 906 N. Spaulding St., plans to build a 1-story factory costing $260,000. Plans are by Friedman, Alschuler & Sincere, 28 E. Jackson Blvd.

INDIANA

INDIANAPOLIS—J. D. Adams Co., 217 S. Belmont St., has awarded a $140,000 contract to Foster Engineering Co. Ltd., 4741 E. Washington St., for a 1-story, 100 x 540 ft factory addition. Architect is C. Wilbur Foster, 4741 E. Washington St.

SOUTH BEND, IND.—Fruehauf Trailer Co., Detroit, has had plans completed by H. L. Wagner, 15 W. 10th St., Kansas City, Mo., for a 1-story factory branch, 123 x 213 ft. Cost will be $144,000.

IOWA

CEDAR RAPIDS, IA.—Collin Radio Co. has plans completed by Graham, Anderson, Probst & White, 1417 Railway Exchange Bldg., Chicago, for a $360,000 factory addition.

DAVENPORT, IA.—Midwest Metals Corp. has been formed by Joseph McCarthy with a capital of $300,000 to distribute and fabricate steel and other metals.

KENTUCKY

LOUISVILLE, KY.—North American Phosphate Co., 735 Bergman St., plans to build a $100,000 fertilizer plant.

MICHIGAN

BAY CITY, MICH.—Electric Auto-Lite Co. is taking estimates for construction of a $550,000 project which includes an addition to its plant and a new building.

CLAWSON, MICH.—G. & G. Kellering Co., 140 Pare St., has been formed by Howard S. Griffin with a capital of $50,000 to manufacture tools, dies and machinery.

CLINTON, MICH.—Efficient Engineering Co., Detroit, plans construction of a $200,000 factory here and a building at Britton. Nathanial Gould is the architect.

DETROIT—Griffin Wheel Co. suffered $75,000 damages recently from fire.

DETROIT — Micromatic Hone Corp. has awarded a $240,000 contract to Austin Co. for a factory.

DETROIT—City has CPA approval for construction of a $720,000 storm water pumping station.

DETROIT — American Blower Corp. has a $220,000 contract with Austin Co. for a steel warehouse.

DETROIT—Induction Devices Co., 1312 Mt. Elliott, has been formed with a capital of $50,000 to sell and manufacture tools, dies, jigs, gages and fixtures.

DETROIT—Arco Die Cast & Metal Co. has awarded F. H. Martin Construction Co. the contract for a foundry addition. Charles Agree is the architect.

GRAND RAPIDS, MICH.—Superior Machine & Tool Works Inc., 528 Butterworth S.W., has been formed by Robert Roberts with a capital of $75,000 to manufacture tools, dies and mechanical equipment.

KALAMAZOO, MICH.—Durnkly Co. has CPA approval for construction of a $83,650 manufacturing plant.

LANSING, MICH.—McConnell Sheet Metal Inc., 610 May St., has been formed by George F. McConnell, with a capital of $50,000 as a metal and metal fabricating business.

MT. CLEMENS, MICH.—Mt. Clemens Metal Products Co. has CPA approval to construct a $72,000 factory.

MUSKEGON, MICH.—City is planning construction of a $1 million water system improvement project.

OTSEGO, MICH.—Span Screw Products & Engineering Co., 601 S. Wilmot Ave., has been formed by Lyle P. Burge with a capital of $50,000 to manufacture screw machine products and stampings.

ST. JOSEPH, MICH.—Central Castings Co., 607 Ann St., has been formed by G. M. Potter with a capital of $50,000 to manufacture and sell metal castings.

MINNESOTA

DULUTH—Union Compressed Steel Co., 5220 Polk St., has been incorporated with a capital stock of $100,000 to deal in iron, steel and metal products. Incorporators are Leonard Rosen, Albert Frank and S. H. Rosen.

HOPKINS, MINN.—Minneapolis-Moline Power Implement Co. plans construction of a crane runway to cost about $80,000.

MANKATO, MINN.—Northern States Power Co., A. S. Keely, construction superintendent, 15 S. 5th St., Minneapolis, plans a $410,000 project near here which will include a steam electric generating plant.

ST. PAUL—Northern Pacific Railway Co., Northern Pacific Railway Bldg., has awarded a general contract to Al Johnson Construction Co., Foshay Tower, Minneapolis, for extension to shop building to handle overhauling of diesel locomotives. Cost will be $350,000. Cranes and other equipment will be installed.

MISSISSIPPI

MERIDIAN, MISS.—Berg Plastics & Die Casting Co. plans to build a $2 million plastics manufacturing plant.

NEW JERSEY

GLOUCESTER, N. J.—Texas Co., 135 E. 42nd St., New York, will build an oil refinery here at an estimated cost of $1,786,350.

NEW YORK

JAMESTOWN, N. Y.—Jamestown Metal Equipment Co., Allen St., has asked for bids on a $75,000 1-story, 191 x 265 ft factory.

NORTH TONAWANDA, N. Y.—Glidden Bros. Machine & Tool Co. suffered fire damage at its main building estimated at about $50,000.

NORTH DAKOTA

FINLEY, N. D.—Sheyenne Valley Electric Co-operative Inc. has REA funds for $350,000 for system improvements and 165 miles of line.

WATFORD CITY, N. D.—McKenzie Electric Co-operative has REA funds of $355,000 for system improvements and 166 miles of line.

OHIO

CLEVELAND—Tinnerman Products Inc., 2038 Fulton Rd., is planning to erect a 15,000 sq ft warehouse building on Brookpark Rd.

CLEVELAND—Iron Fireman Mfg. Co., 3170 W. 106th St., is contemplating construction of a 1-story, 50 x 320 ft factory addition. Metal presses will be installed.

CLEVELAND—New York, Chicago & St. Louis Railroad, Terminal Tower, will build a locomotive repair shop here to cost $210,000 and a building for storage and employee facilities at Bellevue, O., to cost $150,000.

OREGON

ST. HELENS, OREG.—American Smelting & Refining Co., 120 Broadway, New York, plans to build a $10 million zinc smelter here.

SOUTH CAROLINA

AIKEN, S. C.—Aiken Electric Co-operative Inc. will spend $370,000 for 252 miles of line.

TENNESSEE

LAFAYETTE, TENN. — Tri-County Electric Membership Corp. has $770,000 to spend for system improvements and 477 miles of line.

TEXAS

ABILENE, TEX.—West Texas Utilities Co., plans additions to its utilities plant which, with equipment, will cost $1,141,000.

ABILENE, TEX.—Rock Island Refinery Corp. of America, c/o L. B. Simmons, Duncan, Okla., plans improvements to its refinery plants which will cost $100,000.

HOUSTON, TEX. E. I. duPont Co., 2219 McKinney St., will build a $2 million plant for manufacture of paper containers.

HOUSTON, TEX.—Singer Sewing Machine Co., 1010 Rusk St., has plans completed by MacKie & Kamrath, 2017 W. Gray St., for a $120,000 repair and assembly shop.

VIRGINIA

CREWE, VA.—Southside Electric Co-operative will spend $1,203,000 for system improvements and 669 miles of line.

CANADA

EDMONTON, ALTA.—Imperial Oil Co. Ltd., 50 Church St., Toronto, has asked for bids on a proposed $300,000 oil refinery.

EDMONTON, ALTA.—Canadian Liquid Air Co. Ltd. has asked for bids on a proposed $250,000 plant to produce oxygen and acetylene gases.

AURORA, ONT.—Dog Paw Gold Mines Ltd., c/o T. F. C. Cole, 320 Bay St., Toronto, is asking for bids on a $200,000 mining development project.

RED LAKE, ONT.—Buffalo Red Lake Mines Ltd., 372 Bay St., Toronto, is asking for bids on three-compartment shaft estimated to cost $135,000. Engineer is R. W. Richardson, c/o owner.

ST. LAMBERT, QUE.—Woods Mfg. Co. Ltd., 2660 Mullins St., Montreal, is asking for bids on a 1-story, 160 x 500 ft manufacturing building and a 1-story, 50 x 100 ft office and boiler unit. Approximate cost will be $500,000. Engineer is C. A. Norris, c/o owner.

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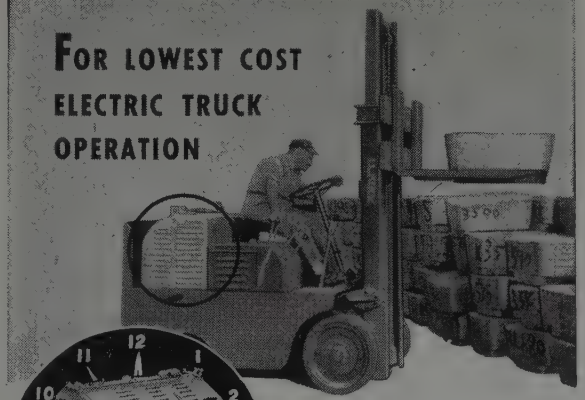

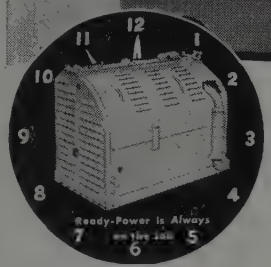

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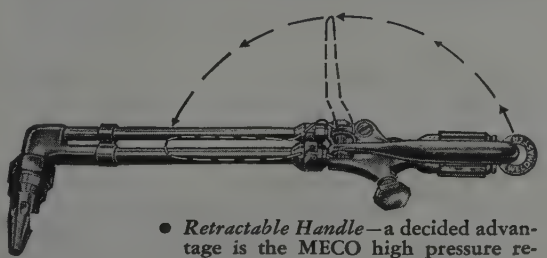

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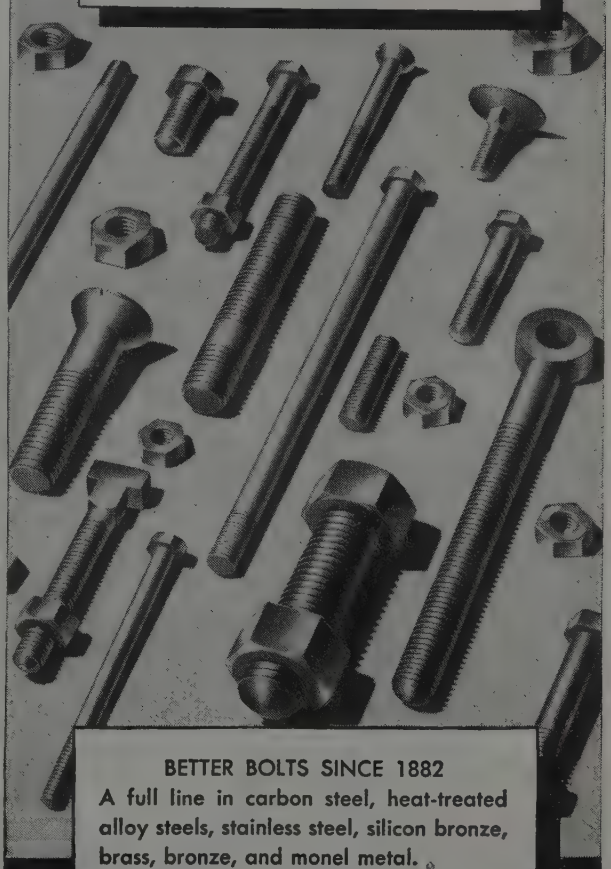

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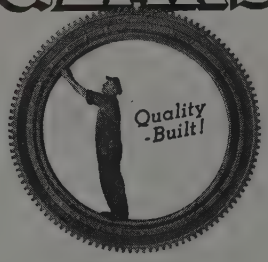

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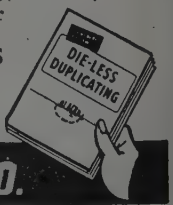

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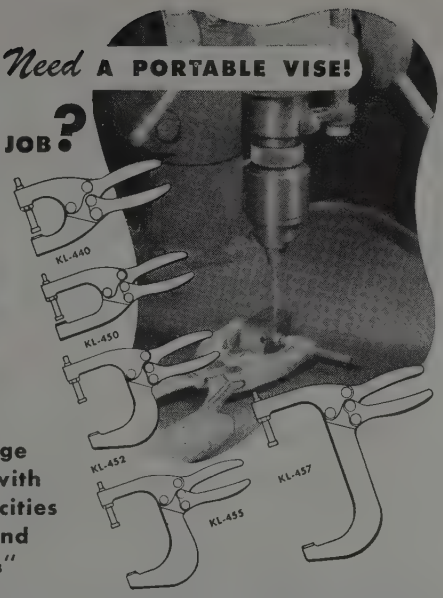

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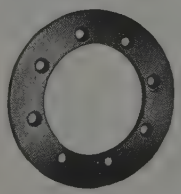

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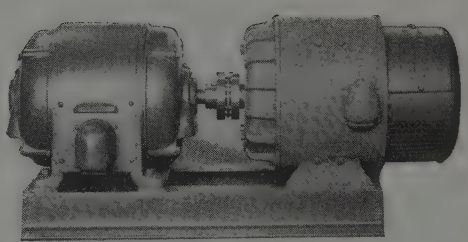

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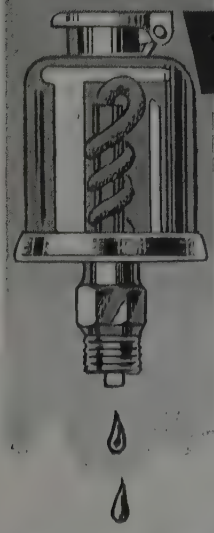

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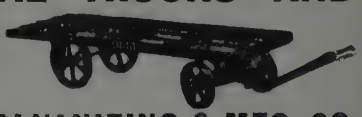

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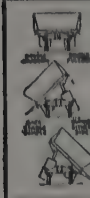

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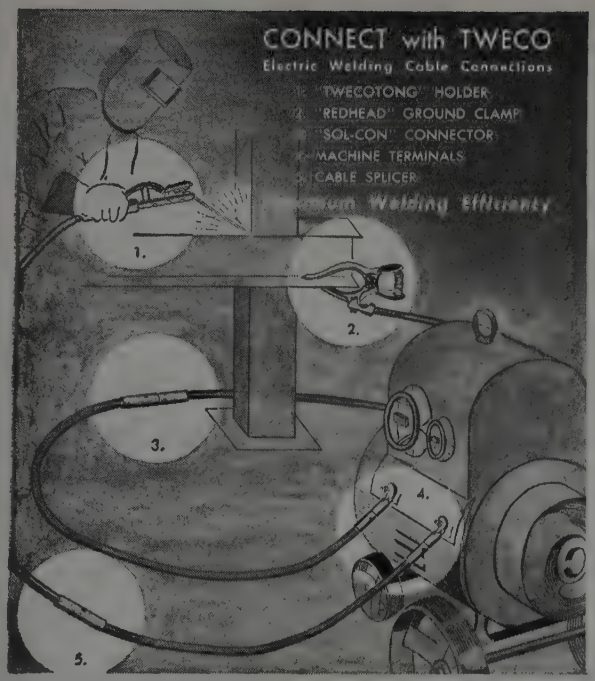

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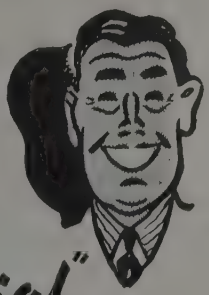

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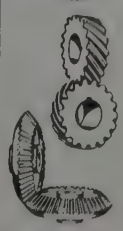

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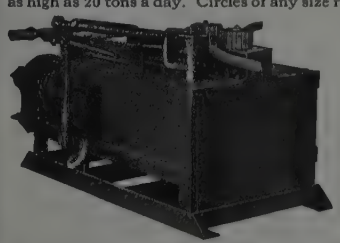

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ADVERTISING INDEX

A

Aetna-Standard Engineering Co., The ..... Inside Front Cover
Agerstrand Corp. 193
Alemite 156
Allegheny Ludlum Steel Corporation 127
Aluminum Company of America 29
American Chain & Cable, American Chain Division 146
American Chain & Cable, Wire Rope Sling Department 132
American Chain Division, American Chain & Cable 146
American Hoist & Derrick Co. 30
Ampco Metal, Inc. 140
Anaconda Wire & Cable Co. 19
Arcos Corporation 128

B

Babcock & Wilcox Co., The, Refractories Division 107
Baker-Raulang Co., The 124
Basic Refractories, Inc. 5
Bay City Forge Co. 189
Belmont Iron Works 188
Bethlehem Steel Co. 1
Beverly Shear Mfg. Co. 154
Bixby, R. W., Inc. 193
Brandt, Charles T., Inc. 131
Bristol Co., The 20
Brooke, E. & G., Iron Co. 190
Brown-Brockmeyer Co., The 8
Brown & Sharpe Mfg. Co. 13
Browning, Victor R., & Co., Inc. 188
Buffalo Bolt Co. 155

C

Carborundum Co., The 44
Ceilcote Co., The 190
Chicago Perforating Co. 189
Cincinnati Grinders, Inc. 72, 73
Cincinnati Milling Machine Co., The 72, 73
Clark Tructractor, Division of Clark Equipment Co. 144
Cleveland Punch & Shear Works Co., The 18
Cleveland Twist Drill Co., The 52
Continental Steel Corporation 79
Cowles Tool Co. 187
Crucible Steel Company of America 49

D

Darwin & Milner, Inc. 187
Differential Steel Car Co. 188
Duffin Iron Co. 153

E

Eastman Kodak Co. 121
Economy Co., Inc. 191
Electro Metallurgical Co. 47
Employers Mutual Fire Insurance Co. 116, 117
Employers Mutual Liability Insurance Company of Wisconsin 116, 117
Enterprise Galvanizing Co. 188
Erdle Perforating Co., The 187
Eureka Fire Brick Works 189

F

Farrel-Birmingham Co., Inc. 41
Fitzsimons Co., The 22
Foster, L. B., Co. 191, 192

G

Gates Rubber Co., The 50
General American Transportation Corp. 111
General Chemical Co. 85
General Electric Co. 45
Gerding Bros. 193
Gisholt Machine Co. 25
Gits Bros. Mfg. Co. 188
Grant Gear Works 180

H

Hannifin Corporation 150
Harnischfeger Corporation 38, 39
Harrington & King Perforating Co., The 179
Hassall, John, Inc. 186
Heil Process Equipment Co. 190
Hendrick Manufacturing Co. 152
Hevi Duty Electric Co. 173
Houghton, E. F., & Co. 34
Hughes-Keenan Co., The 150
Hyatt Bearings Division, General Motors Corp. 76
Hy-Test Division, International Shoe Co. 15

I

Illinois Clay Products Co. 174
Industrial Gear Mfg. Co. 189
Ingalls Iron Works Co., The 9
Ingersoll Steel Division Borg-Warner Corp. 122
Inland Steel Co. ..... Front Cover, 59
International Harvester 11
International Nickel Co., Inc., The 56
International Shoe Co., Hy-Test Division 15

J

Jira Thayer Jennings 193
Johnson Bronze Co. 51
Johnson Gas Appliance Co. 126
Jones & Lamson Machine Co. 105
Jones & Laughlin Steel Corp. 119

K

Kardong Brothers, Inc. 189
Kaukauna Machine Corporation 31
Keokuk Electro-Metals Co. 114
Kester Solder Co. 153
Kline Iron & Metal Co. 191, 192
Knu-Vise, Inc. 187

L

Laminated Shim Co., Inc. 138
Landis Machine Co. 10
Layne & Bowler, Inc. 182
Leschen, A., & Sons Rope Co. 183
Levinson Steel Co., The 137
Levinson Steel Sales Co. 136
Lewthwaite, T. H., Machine Co. 186
Littell, F. J., Machine Co. 181
Lodge & Shipley Co., The 28
Logan Co., Inc. 130
Luria Brothers & Co., Inc. 113

M

Mackintosh-Hemphill Co. 53
Macwhyte Co. 3
Master Electric Co., The ..... Inside Back Cover
Midvale Co., The 42
Midwest Steel Corp. 192
Miller & Co. 114
Modern Engineering Co., Inc. 185
Moline Tool Co. 179
Monarch Machine Tool Co., The 54
Monarch Steel Co. 22

N

National Acme Co., The 32
National Lead Co. 12
National Machinery Co. 23
National Roll & Machine Co. 181
National Steel Corporation 17
New Britain Machine Co., The 6

O

Oakite Products, Inc. 178
Ohio Galvanizing & Mfg. Co., The 188
Ohio Locomotive Crane Co., The 188
O'Neil-Irwin Mfg. Co. 186
Ozalid Division of General Aniline & Film Corp. 123

P

Pawtucket Manufacturing Co. 185
Paxson Machine Co. 177
Penflex Sales Co., Division of Pennsylvania Flexible Metallic Tubing Co. 139
Perkins, B. F., & Son, Inc. 175
Pesco Products Division, Borg-Warner Corporation 148
Philco Corporation, Storage Battery Division 125
Pittsburgh Commercial Heat Treating Co. 189
Pittsburgh Plate Glass Co., Paint Division 35
Poole Foundry & Machine Co. 183
Potter & Johnston Machine Co. 27
Power Plants, Inc. 187

R

Ready-Power Co., The 185
Reliance Electric & Engineering Co. 37
Republic Steel Corporation 40
Reynolds Metals Co., Aluminum Division 21
Rockford Machine Tool Co. 141
Ross Heater & Mfg. Co., Inc. 171
Russell, Burdsall & Ward Bolt & Nut Co. 103
Ryerson, Joseph T., & Son, Inc. 60

S

Salkover Metal Processing 193
Seymour Manufacturing Co., The 26
Silent Hoist & Crane Co. 154
Simonds Gear & Mfg. Co., The 186
Standard Pressed Steel Co. 24
Standard Tube Co., The 147
Stanley Works, The 188
Sturgis Products Co., The 183
Sun Oil Co. 134, 135
Sundstrand Machine Tool Co. 43

T

Thompson Grinder Co., The 145
Timken Roller Bearing Co., The ..... Back Cover
Toledo Stamping & Manufacturing Co. 190
Topflight Tool Co. 190
Torrington Co., The 48
Towmotor Corporation 133
Tri-Boro Steel Supply Co., Inc. 142
Tubular Service Corporation 188
Tweco Products Co. 189

U

Union Carbide & Carbon Corporation 47

V

Vanadium Corporation of America 7

W

Wall Colmony Corporation 36
War Assets Administration 14, 46, 143
Warner & Swasey 2
Warren City Manufacturing Co., The 87
Wasseli Organization 149
Weinman Pump & Supply Co., The 189
Weirton Steel Co. 17
Wheeling Steel Corporation 190
Wire Rope Sling Department, American Chain & Cable 132
Wisconsin Motor Corporation 152
Wolverine Tube Division Calumet & Hecla Consolidated Copper Co. 129
Worth Steel Co. 33
Wrigley, Wm., Jr. Co. 172
Wrought Washer Mfg. Co. 177

Y

Young Brothers Co. 16

Z

Zeh & Hahnemann Co. 186

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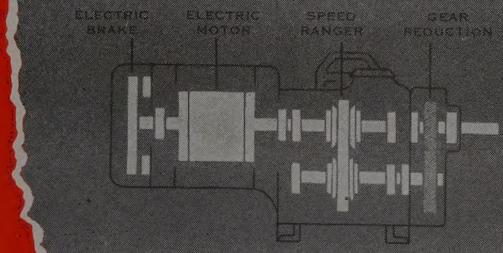
Table of Contents, Page 55
Classified Advertising, Pages 191, 192, 193



On thousands of applications in every field of manufacture, stepless variable speed operation assures exactly the right speed for every operation . . . for every operator . . . and for each change in the consistency or shape of the material being processed. Such variable speed operation pays off in higher rates of production, a more uniform better quality product and more efficient performance of your equipment and your operators.

Master Speedrangers provide this infinitely variable speed in a compact, all-metal, mechanical variable speed unit whose durability and stamina has been proven with millions of hours of service all over the world. And nowhere else will you find units that are so flexible, so easily adaptable and in such a wide range of sizes.

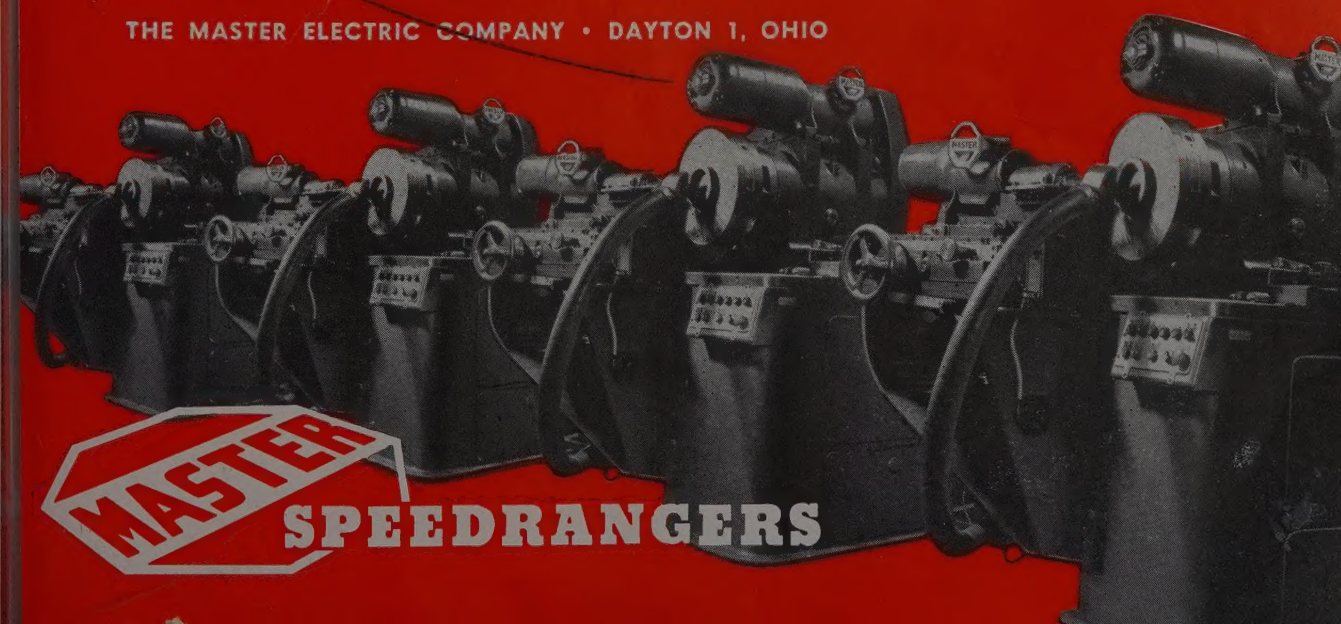
For example, look at the ring grinders shown below. The Speedranger, on the drive unit incorporates an electric brake, an electric motor, a variable speed unit and a gear reduction . . . all standard Master units that easily combine into one compact, integral power package. This provides exactly the right speed, the right features, in a unit that you can mount right where you want it.

variable speed operation doesn't cost

IT PAYS

Probably you will not need this same combination of features. However, the next time you need a drive for material processing, handling, and conveying equipment; mixers and agitators; welding-positioners; machine tool drives; testing and calibrating equipment . . . to name only a few . . . see what a really remarkable job Master Speedrangers can do for you. Write for Data 7525, the new twenty-four page booklet on Speedrangers.

THE MASTER ELECTRIC COMPANY • DAYTON 1, OHIO



MASTER SPEEDRANGERS

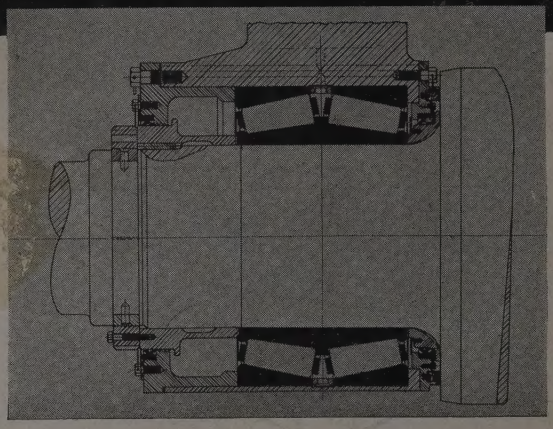
Timken Two-Row BALANCED PROPORTION Bearings

have an outstanding service record

Timken Two-row Balanced Proportion Bearings have been performing capably for many years in various types of rolling mills.

A typical example is a two-row double cone bearing having an outside diameter of 29.500″, a bore of 17.995″ and a width of 16½″; 163 bearings of this size have been shipped; 23 more are on order.

These bearings are used in one installation of a continuous hot strip mill and in additional installations of ferrous and non-ferrous cold mills. Their performance has greatly surpassed the best expectations of the mill operators in a number of cases where especially heavy loads were encountered. The Timken Roller Bearing Company, Canton 6, Ohio.



Two-row Timken Balanced Proportion Back-up Roll Bearing — cylindrical bore.

TIMKEN

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